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# CHEMICAL & METALLURGICAL ENGINEERING

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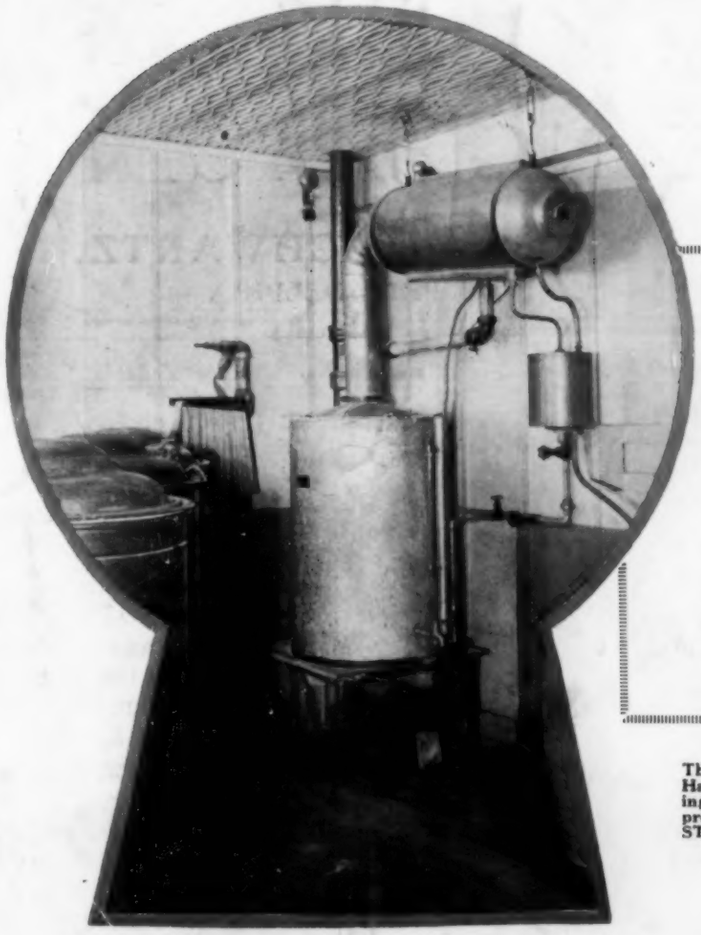

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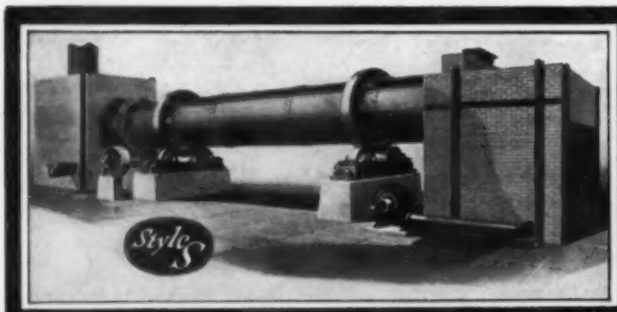


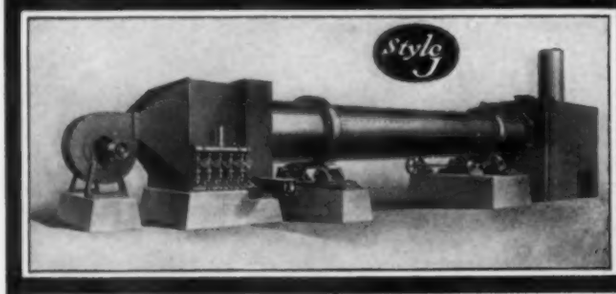


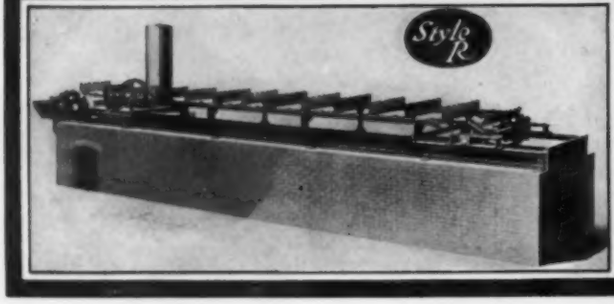


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# CHEMICAL & METALLURGICAL ENGINEERING

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H. C. PARMELEE
*Editor*

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## Correcting An Error

THROUGH a regrettable oversight in our issue of Dec. 22, 1924, we failed to give due credit for the development of the du Pont cyanide process there described by H. G. Chickering. The author had previously submitted a closing paragraph, which we overlooked, to the effect that "the development of this cyanide process is due to the ingenuity and efforts of a number of men, among whom should be mentioned particularly Charles B. Jacobs and Roger Williams." We are glad to publish the fact now in an effort to rectify the omission. At the same time acknowledgment is made of the fact, also overlooked at the time, that the paper was presented at the Pittsburgh meeting of the American Institute of Chemical Engineers last December.

## Waste Elimination As a Creed for Industry

SLOGANIZING has infected American business to an unfortunate extent. Some one hits upon a happy word combination and it immediately becomes a war cry that drowns out constructive thinking and reduces an industry to a basis of formulas and catch words. But in striking contrast we sometimes find a statement of principles that becomes a creed, and there is a vast difference between a creed and a slogan. Herbert Hoover's campaign for the elimination of waste is a creed that seems to have directed his every official activity. It is becoming more and more apparent that the seemingly unrelated work in which the Department of Commerce has been engaged during the past 4 years is in reality a logical progression toward a single great objective—the elimination of broad economic waste. Mr. Hoover's recent remarks on the problem of distribution have focused attention first on the existence of these great wastes and second on our actual experience with the means for their elimination.

Appreciating the fact that there is no single panacea for all of our economic troubles, nor any shortcuts to business progress, Mr. Hoover has well said: "It is only through the elimination of waste and the increase in our national efficiency that we can hope to lower the cost of living on the one hand and raise our standards of living on the other. The elimination of waste is a total asset. It has no liabilities." An investment last year of $100,000 in the one phase of this work carried on by the Department of Commerce has resulted in the reduction of wastes in our economic system that are believed to have exceeded $600,000,000 per year. This has been accomplished by establishing standards that have brought economies in production and distribution, by eliminating unnecessary varieties and sizes of commodities, by building up statistical services that protect against booms and depressions and help to stabilize industry, by simplifying business practices relating to contracts and specifications, by co-ordinating transportation facilities, and finally by improving the ethical standards that have permitted unfair and wasteful competition.

These separate lines of attack, and many others besides, have been gradually advancing toward the one great objective. As these movements get under way their interlocking relations become more apparent and concerted action is productive of greater results. The problem of distribution becomes one of common interest to all lines of industry and all can contribute to the practical process of eliminating its costly wastes.

## The Public Printer Sets an Example

WITHIN the covers of a pamphlet bearing the prosaic title "Annual Report of the Public Printer, 1924" we have discovered a public document of unusual interest which refutes the common impression that government offices are extravagant of funds and inefficient in production. The Government Printing Office occupies one of the leading places, if not the foremost place, in the printing industry of the entire world; and it is reassuring to learn that in the past 4 years the Public Printer has, by avoiding waste and increasing efficiency, saved $4,650,218 from total available resources of $50,321,621. During the same period he also deposited in the treasury $1,083,857 as miscellaneous receipts from sales of waste paper, useless equipment and surplus government publications. The great growth in the sale of government publications leads to his recommendation that the present wasteful system of free distribution be discontinued and that substantially all government publications be placed on a sales basis. As an example of efficiency and good management the Government Printing Office can be commended to other federal organizations.

But the report contains matters of technologic interest also, for the Government Printing Office maintains a department of tests presided over by an able chemist in the person of Edward O. Reed. This fact of itself is evidence of the progressive spirit of the Public Printer. Quite naturally a large part of the duties of the testing department consists in routine examination of paper, textiles, leather, ink-making materials, metals, oils, waxes, glues, etc. This is supplemented by investigational work preliminary to the preparation of specifications for the various materials used by the office: flexible bindery glue, dyes for ruling-inks, silicate of soda for sealing fiber containers and the manufacture of half a dozen different kinds of ink. While much of the work of the testing section cannot be expressed in money value, the chief of tests has not

neglected to make a statement of the financial savings effected by his section during the year.

One of the items of human, as well as technical, interest in the report is the narrative of the conviction of several violators of the federal prohibition law and the part played by Mr. Reed and his department in aiding the government to obtain the conviction. The defendants were charged with the illegal withdrawal of vast quantities of whiskey from bonded warehouses by the use of counterfeit and forged permits. More than 300 suspected permits were examined by printing experts and most of them were found to be counterfeit. A number of them, however, had been so cleverly reproduced by the process of photo-engraving as to defy detection by ordinary examination. Consequently it was necessary to call in the chief of tests, who showed that, whereas the genuine permits had been printed on 50 per cent rag paper with the government watermark running lengthwise of the sheet, the suspected permits were printed on paper varying from an all-wood pulp to 95 per cent rag content with the watermark across the machine direction instead of lengthwise of the sheet as in the genuine paper. The incident is typical of the service that science can render to industry, as well as of the efficiency which follows the application of engineering methods.

## Popular Crazes and The Ultimate Outcome

TIMES have changed, as the saying goes. An eighteenth-century story relates how a gushing dame congratulated Samuel Johnson that there were no naughty words in his dictionary.

"Ah, madam," was the prompt reply. "So you've been looking for them."

Nowadays, words of all kinds, seldom naughty, however, are being sought in an effort to elucidate the cross-word puzzle, the latest infliction on an already overworked people. A few college professors, on tiptoe in the hope of being caught in the limelight, have proclaimed that the craze has an educational significance. Instead of one word for a specific designation, people are being taught to realize that there are ten or so, each of which is equally suitable. By the wider use of the dictionary, it is claimed, the ignorant will acquire an appreciation of the scope and extent of the English language. Our opinion, however, is that this latest development will make confusion worse confounded, ultimately leading to the more careless, instead of the more careful, use of words. Its weakness lies in the fact that its sponsors appear to have no appreciation of the value of precision and clarity.

A distinguished critic once remarked that the English language possesses few if any synonyms; there is a significant, obvious or delicate shade of difference to be discerned by the practiced hand between words of similar meaning. And it is in the development of this appreciation of aptness that lies the effective use of English—a language which, on account of its association with economic supremacy, has displaced French in diplomacy; and, because of its comprehensive vocabulary, has become the foremost vehicle in publicity on world progress in science and technology.

To teach that "while" is a synonym for "inasmuch as," and "since" a synonym for "whereas" is indicative of educational retrogression. The dictionary is a useful volume; but those who are accustomed to the control of instruments of precision will realize that many a word is listed therein for a specific sense for which it is inapt, inapplicable or entirely unsuitable. There are few short cuts to efficiency. The average coal miner if let loose in a well-equipped laboratory would make as much progress in the correct selection of reagents as the average cross-word puzzle fan, provided with a dictionary, would make in the correct selection of words.

## Getting Rid of the Water in Foodstuffs

FROM the point of view of economy, efficiency, avoidance of waste and the maintenance of health standards, the progress made in recent years in the condensation and drying of foodstuffs is likely to have a significant influence on economic conditions. The ability to preserve food, destined for human consumption, almost indefinitely at atmospheric temperatures—food that "goes bad" under ordinary conditions in a few hours or in a few days—is an achievement that merits more than passing attention, that justifies the provision of funds for adequate research. Canning has done much, but drying by scientific methods may do more. Bacilli cannot develop in dryness.

Popular prejudice in favor of fresh food will doubtless be modified in course of time. The product of careful chemical control will be welcomed when the value of a scientific standard of quality is realized. Synthetic camphor is pure camphor, but objections have been raised on the ground that it does not possess the same attractive aroma as does the natural product. The trouble is that the natural product is with us all the time. Similarly, condensed milk is taboo in most homes, for no other reason than because it is a product of precise technical control. Its density gives it preserving powers far beyond that of the raw material from which it is made. We were privileged to go over a large evaporated milk factory recently and were somewhat surprised to find that each can is subjected to an extended period of test after sterilization, by which the sale of one single faulty package is prevented with almost absolute certainty. Bottled milk cannot be subjected to a similar test. Its cost to the consumer is still dependent on the expense of freighting and distributing the large amount of water it contains and the heavy glass bottle in which it is sold. Even the average economical housewife has a prejudice against condensed milk; yet when her spouse takes her out to dinner "as a treat" she will probably thoroughly enjoy the "cream," which is often composed of 50 per cent canned condensed milk, and the delicacies made therefrom. What we don't know doesn't hurt.

The drying of fruits has served to stabilize one of the basic industries of this country. Fresh grapes are more acceptable than raisins, yet the latter product is by far the more important of the two. Even the poor prune is being justified by usage. Dried pears, peaches, plums and apricots are standard kitchen stocks; we no longer make invidious comparison between them and the fresh fruit. The dehydration of most vegetables will be a consummation that will result in enormous economies, stabilizing markets and bringing valuable foodstuffs where they are now unobtainable. The loss in bulk, from 50 to 80 per cent, by drying is a favorable factor, to which may be added the advantages of uniformity, "keeping" quality at any temperature and

avoidance of danger from bacterial development. The dried-fish industry is the latest to adopt scientific processing methods. It is not too much to predict that the meal of the future will be prepared almost entirely from dried foods. It may be averred that some of the vitamins will be missing from such a diet. By that time we shall be able to add these, mixed and assorted according to requirements, from a pepper caster.

## The Inevitable Consequence Of Buying on Price Alone

A ROOFING manufacturer of our acquaintance had occasion not long ago to make a large extension of his plant. He very wisely employed capable engineers to design this plant and select its equipment. He gave the construction contract to an extremely able and trustworthy contractor. But—and this is where he made the mistake that far too many other manufacturers are making daily—when he bought his accessory equipment, items such as conveyors, motors, switches, etc., he bought on price.

Fortunately for our friend, he was safe in the hands of most of the people from whom he bought, for they valued their reputations too highly to risk supplying equipment that would not serve. However, in the case of certain purchases, made against the urgent advice of the consulting engineers, the result was the one that usually comes from buying on price considerations alone. After 11 months service, equipment costing $14,000 had to be scrapped. Its place was taken by new equipment costing just short of $20,000. So, for the sake of saving $5,000 a much greater sum was thrown on the junk heap in less than a year.

No one needs the moral of this story pointed out. It is perhaps the stalest of all morals for industrial executives. It has been preached about continuously for years. And yet, with all this talk, the practice of buying at the lowest price, regardless of quality, still continues unabated. It is necessary to make again the plea that equipment be purchased only after obtaining competent engineering advice and that this advice be accepted.

## Science and the Demolition Of International Barriers

CECIL RHODES, when he revised his now famous will, extended the scope of his educational bequest to include Germany; and he did this when he learned that the teaching of English in German schools was to be made compulsory. He always maintained that a common language is the best tie. Friction may possibly occur more frequently among members of the same family; but a basic understanding of character and motives makes possible an early settlement of the dispute.

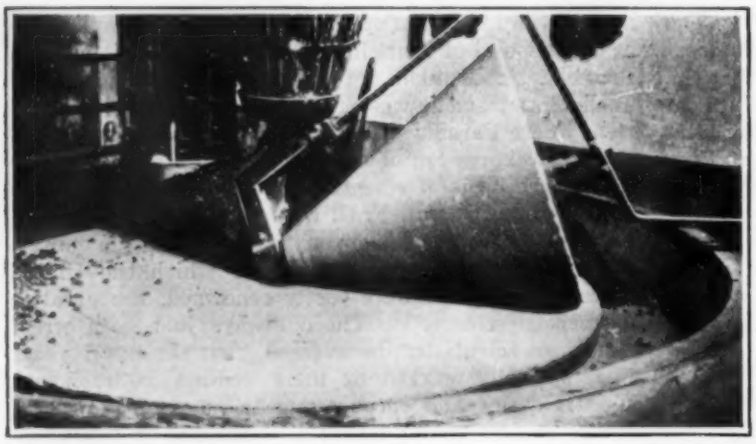
Next to language, science is the strongest link between the civilized nations of the world, a link that remains unbroken through tribulation and disaster, and in spite of the scheming of politicians and the machinations of the unscrupulous. In reviewing recent progress in international co-operation it is interesting to note that mutual appreciation, the most helpful of convictions, is becoming increasingly evident on both sides of the Atlantic. For instance, the bestowal of the Faraday medal is an indication of one of the highest compliments at the disposal of British scientists. In 1924 it went to Prof. R. A. Millikan, of the California Institute of Technology; and it was presented at the Royal Institution, where Faraday worked. The occasion was one for a mutual expression of esteem, prompted by a sincerity that is the basis of scientific analysis. In proposing a vote of thanks, Prof. F. G. Donnan paid us the compliment of saying that his experience prompted the opinion that "among the great things for which the United States of America were justly renowned, the greatest was their science." "There always had been great American scientists," he averred, "but the last 7 years were specially marked by their 'red-hot' enthusiasm." This is a fine and encouraging tribute, an augury of future success in the technical industries of this country. Professor Millikan, responding, maintained that "it was not, after all, so much a question of where one lived; the development of science diminished the importance of geographical position." If leaders of scientific thought on both sides of the Atlantic, of the caliber of Donnan and Millikan, can be so appreciatively generous in their estimate of achievement overseas, we can afford to ignore the invidious comments and comparisons of the smaller fry.

## Beehive Coke Production, An Industrial Barometer

THE production of beehive coke is climbing steadily from week to week and the output of byproduct coke is advancing slowly also. These increases forecast very definitely the gradual, but important, increase in pig iron and steel production. They are indeed an indication of general industrial improvement.

With changing steel demand there is changing coke demand, and much of the change in coke output is made by increasing or decreasing the beehive oven activity. Weekly figures are given by the U. S. Geological Survey for the production of beehive coke and monthly reports for the production of byproduct coke. Taken together, these two statistical services are of great value to industry. They afford a forecast of steel activity that seems to be more reliable than almost any other industrial barometer. Indirectly they indicate the probable demand for alloying elements as deoxidizers in steel manufacture and for the constituents of alloy steels. The demands for sulphuric acid for pickling steel and for the other materials interlocked with the metallurgical business are also forecast.

Naturally the change in coke production is most rapid in the beehive branch of the industry and weekly reports give a prompt indication of such changes. These changes are also an indirect indication of increases or decreases in availability of ammonium sulphate, of benzol and other light oils, and of coal tar, even though the beehive oven produces none of these byproducts. This is true since whenever the beehive oven activity is changing it is generally true that the byproduct oven activity is changing in the same direction and to an almost equal extent, measured by actual tonnage of coke, not by percentage. Hence the beehive figures do afford a rough approximation of change in byproduct output. Therefore, not only the metallurgist but also the fertilizer, the motor-benzol and the tar-refining industries can watch the beehive coke figures as a significant guide in their industrial planning.

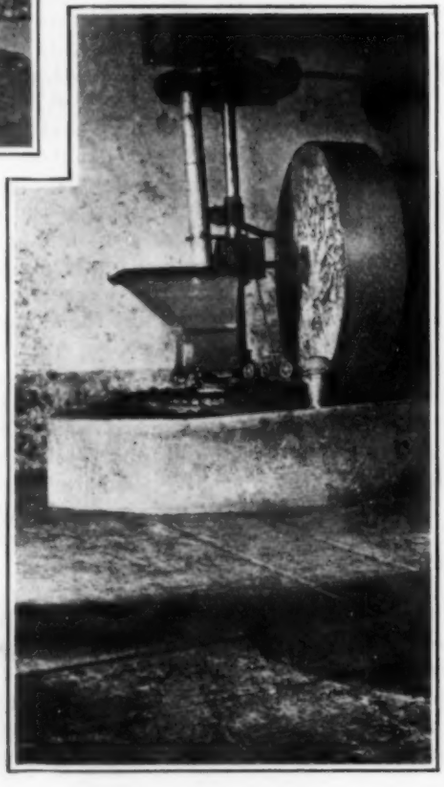


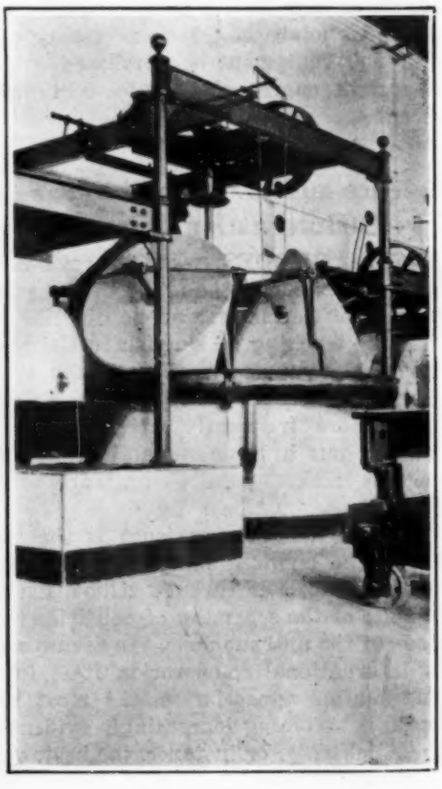
*Left—A single-cone olive mill, of ancient make, in a Spanish olive oil factory.*

*Left, below—Olive mill in the ruins of Pompeii, Italy. The square hole is for a sweep pole, to the end of which an animal is hitched. The top of the upper grinding member is cupped to receive the olives.*

For the manufacture of olive oil, the fruit is crushed usually by one or more stone cones that revolve in a stone trough, mule or ox power being used extensively, though more modern installations are not uncommon now.

The pulp from the crushers is handled in one of several types of press—hand power, beam or hydraulic. The "cloths" used are circular in shape and made of esparto grass or similar material, woven so that an edging is formed to inclose the cake. Oil and juice are usually separated from each other by specific gravity differences, but centrifugal methods are being adopted in France and the possibility of continuous pressing is being investigated. The press cake is dried and the remaining oil is extracted with carbon bisulphide or trichlorethylene, the latter being preferred because of the fire hazard with the former.





*Right—An efficient type of mill used at Tortusa, Spain. Also interior of olive-oil plant near Seville, Spain, using cone and ordinary edge runners, with stone grinding members.*

# Modern Technology Enters the Olive Industry

## In the Crushing Mills and in Decolorizing the Oil There Is Evidence of Chemical Engineering Thinking

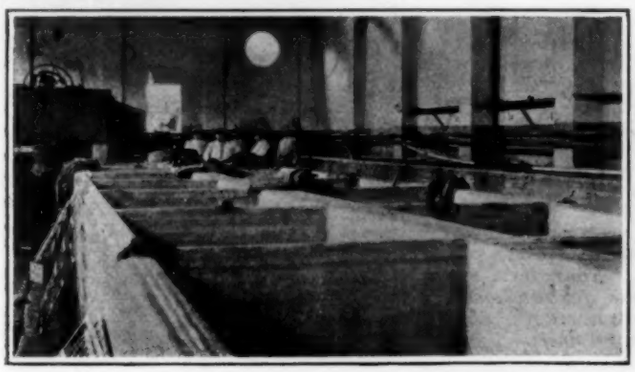
THE importance of the olive industry in the Mediterranean basin is evidenced by the fact that 12,000,000 acres of land is under cultivation to produce the fruit, as compared with 30,000 in the United States, in California. In spite of the comparatively small size of the domestic industry, depression has been in evidence, due in large measure to an occasional outbreak in the past of botulinus poisoning, caused by canned ripe olives. This menace has now been removed by the provision of an adequate safety factor in the sterilizing stage of processing, by state regulation and by drastic factory supervision; but it was felt that a study of European methods and the acquisition of first-hand knowledge of details of manufacture would provide valuable data for American producers. As the result of the personal initiative of W. V. Cruess, associate professor of fruit products at the University of California, supported by the California Ripe Olive Association and with the co-operation of various agencies abroad, an intensive study was made

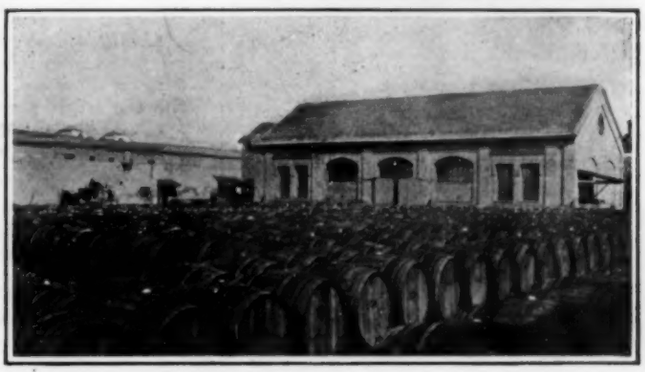
*At top of page (left) — Bull cart used in Spain for transporting olives, which are discharged by opening a flap in the "basket" in the rear. (Right)—Receiving the olives at a pickling factory. Lug baskets are used. Note the intense desire of bystanders to be included in the picture.*

*(Below, left) — Olive-pickling vats at a Seville factory, in which the fruit is treated with dilute caustic soda solution, to eliminate bitterness and to facilitate subsequent fermentation.*

*(Left and also right, below) — Hogsheads, exposed to the heat of the sun, in which green olives are fermented. Note the fermentation spume at the bungholes.*

*(Right)—Adding the make-up brine to the hogsheads of fermenting fruit at an olive-curing plant at Seville, Spain.*





of methods in France, Italy and Spain. Professor Cruess, who recently returned to the United States after completing this study, addressed the members of the California Section of the American Chemical Society at San Francisco on Nov. 7, the following being a summary of his remarks:

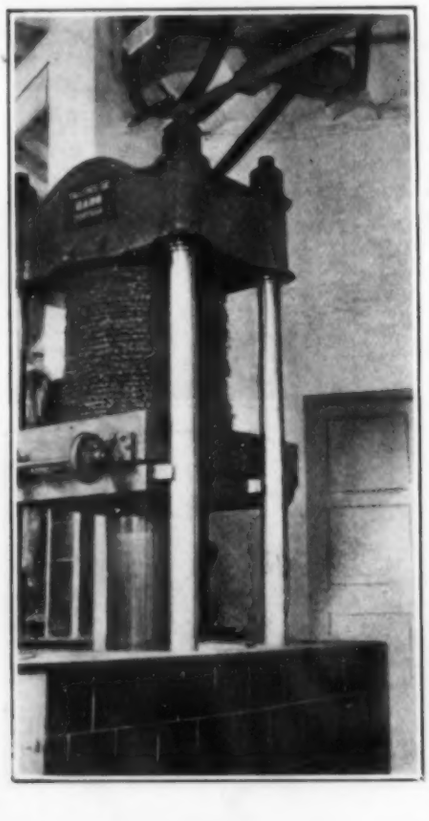
The technology of olive processing may be considered under three headings: Pickling, oil expressing and oil refining. It is interesting to note that European practice in some districts has advanced with the times, and that many mills and refineries are up to date and efficient. Olive oil is used extensively, almost exclusively, in the Mediterranean basin for domestic purposes. The pickling industry is of importance, however, because of the comparatively large quantity of green olives exported to the United States.

In pickling, the olives of a green-yellow color are picked in September and October to avoid the ravages of the olive fly. They are steeped in a 2 per cent solution of sodium hydroxide in concrete vats holding about ½ ton of the fruit. The lye is allowed to penetrate about half the distance to the pit, as indicated by frequent phenolphthalein tests. This preliminary neutralization destroys the bitterness in the raw fruit and makes the olive permeable to the subsequent brine treatment. The fruit is washed in water, but not so that the alkali would be completely displaced, as a small amount of it facilitates subsequent fermentation. The slightly alkaline olives are delivered to wooden hogsheads, together with a salt (sodium chloride) brine testing about 11 deg. Bé. The containers are placed in the sun to hasten bacterial fermentation, which is evidenced by the escape of froth from the open bunghole. The evolved gases are mostly carbon dioxide and methane. This phase of fermentation occupies about 2 weeks, and is followed by an additional period, up to 2 months, of lactic acid fermentation. When the treatment is concluded, the olives are packed in sealed barrels and shipped to New York and Chicago, the main packing and distributing centers of foreign green olives in the United States.

The Greek olive is picked ripe and cured by a simple process of keeping it in contact with rock salt for several days; the ultimate product provides all the incentive needed for a zestful attack on local beverages, irrespective of quality. Some green olives, however, are water cured. The fruit is pinched between rollers and slit with knives, preparatory to submergence in water, which is changed frequently, for 2 weeks or so. The meat is then removed, mixed with garlic, onions, bay leaves and sweet peppers. Opportunity exists in the United States for the manufacture of a similar product, to meet the taste of those of Mediterranean ancestry living here.

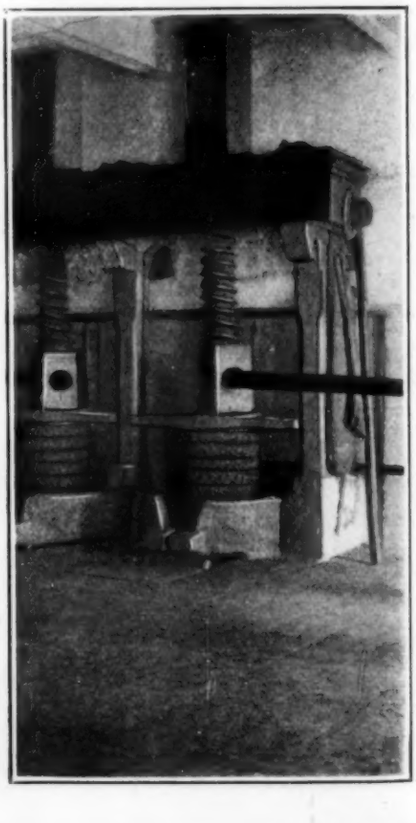
The output of oil from the principal European countries is approximately as follows: Italy, 65,000,000 gal.; Greece, 30,000,000 gal.; France, 10,000,000 to 12,000,000 gal. Olive oil is not so popular among native Americans as are the milder oils used for the same purpose, but much is consumed here by the foreign and foreign-born population. California oil is far from sufficient to meet the local demand. A duty is necessary, however, to counteract the difference in wages paid here and in Europe and to compensate for the better living conditions prevailing in this country. It was mentioned that the total payroll in one European factory visited was equivalent to about $2.65 per day.

The olive oil industry of Spain is expanding; elsewhere manufacturers are "marking time" or curtailing production. Spain lost much of her market during the war because of restrictive export regulations, and her product now has the incorrect reputation of being of second grade. This impression is caused by the fact that the finest Spanish oil is being exported in quantity to France and Italy, for blending with inferior oils, the mixture being sold as a local production.



*After the oil is expressed in such equipment as that here shown, it is filtered. European practice favors plate-and-frame presses and disk filters as against an array of funnels and filter papers in California. Subsequently the oil is deodorized with bone char or some similar material.*

*(Left)—Modern hydraulic oil press operating at a factory at Tortusa, Spain, used for the triple pressing of the fruit. The "cloths" are made of grass.*



*(Right) — Hand-power press found in Italian olive oil plants. Four men turn the machine for an emolument that averages about 45c. per day apiece.*

# Some Pitfalls of Chemical Invention

## The Patentability of an Idea and the Liability of Infringement Are Delicate Matters for the Layman to Decide

By H. A. Toulmin, Jr., and Johnson Heywood
Patent Attorneys

THE duty of a patent attorney is to advise his client on the patentability of an invention and not merely to follow the manufacturer's instructions to get him a patent. Wide experience with the courts has shown that much money can be wasted in applying for patents on "inventions" that are not inventions at all, and more has been lost by concerns that sue infringers on what they think to be valid patents, only to find that their patents are, in the opinion of the court, not valid. Actual infringements are of course still more costly. To see how complicated is the question of "What is an invention?" take the following cases, all relating to the chemical industry. These cases indicate how the courts have answered this question in a variety of ways.

A patent was issued for acid arsenate of lead for use with water to form an insecticide spray. When this patent was sued upon, the defendant who was alleged to be an infringer proved that this was a chemical compound old and well known both in pulp and dry form and that whatever improvement was covered by the patent was one of degree only. It is well settled that when improvement is a matter of degree only and not of material substance, there is no invention.

In another instance a manufacturer patented a welded steel ring in which the grain of the metal ran in circular fashion rather than longitudinally. The court found, upon suit, that this was not invention, as that characteristic was inherent if the metal be rolled in a particular direction and that no patent could be taken out upon the natural physical characteristics. Furthermore, a number of prior rings were proved to have been made of cast metal. A fundamental rule is that a mere change in materials which does not secure a result not naturally inherent in the materials does not amount to invention.

An interesting case in which the Eastman Kodak Co. was involved related to a patent on a transparent sensitive pellicle adapted to photographic purposes, especially in connection with roller cameras. The court found that the patent was valid because the anticipating patent set up by the defendant did not disclose the same subject matter without making changes in order to make the anticipation substantially perfect. In this case the support for the film was nitrocellulose and by the simultaneous use of two classes of solvents, the film support was improved and rendered insoluble in the usual fixing and intensifying solutions. The patentee used nitrobenzol as a solvent, the basic ingredient being nitrocellulose. He used alcohol or its equivalent as a diluent.

The court further held that the patentee is not required to bring his invention to the highest degree of perfection. It is sufficient if anyone who is skilled in that particular art can understand the processes set forth in the patent and if the specifications of the patent show a reasonably practical basis of performing the process. It is not necessary that the patent define the very best commercial process or indeed one that is commercial at all, provided the disclosure is sufficient so that a practical man can, by applying the usual engineering and production skill, make the invention a practical commercial proposition.

> It would seem obvious that any invention worthy of protection should have the benefit of seasoned legal advice from the beginning; yet the records of the Patent Office show that the layman's confidence in his own knowledge has cost industry millions of dollars. In the present paper the authors have shown forcefully that even the clever inventor who acts as his own lawyer may have a fool for a client.

One of the interesting cases in the chemical industry was that of the invention of vulcanized rubber. Dr. Goodyear found that to heat a mixture of sulphur and crude rubber would give what we know today as "rubber." This is an example of another test of invention which has a wide bearing on most branches of chemistry and metallurgy. The mixing of materials which have never been mixed before or the treatment of materials in a new way which have been mixed before, producing in either case a result not hitherto achieved, is invention. It matters not whether the materials or the process are well known if the new combination results in a new product. It is not necessary that it shall be the most perfect product but only sufficiently perfect to open the door to commercial development.

It is necessary, however, for the patent to disclose all of the information essential to this development. For instance, a patent was once granted covering the preparation of a compound for casehardening low-carbon steel. The process consisted essentially in the employment of an oily substance to unite carbonaceous and energizing materials to prevent their deterioration through moisture attacking the compound. It developed in practice that the difference in size between the carbonaceous and energizing elements made the difference between failure and success in practicing the process. The patent, however, failed to specify these particular differences, which had to be known in order to carry out the idea of the inventor. Hence the patent was found to be invalid because it had not made sufficient disclosure of essential information.

In another case, a patent for a process for obtaining naphtha from natural gas by subjecting the gas under pressure to an absorbing menstruum was the subject of a suit. By way of defense it was claimed that this

process was merely an application of the prior method, well known, of obtaining liquid hydrocarbons from other gases produced artificially in the destructive distillation of coal and shale. This is a defense termed "double use." The court found that it was not invention to take old devices and processes and merely apply them to new uses in analogous arts, as this did not require invention.

However, the courts say that even though one or more of the steps in a process are old, if the combination is new and the result is new, this constitutes invention. A case is that of the patent covering a process of preparing methanol from pyroligneous acid. This process consisted of distilling from the acid a concentrated distillate of between 10 and 25 per cent alcohol and of acid nature, allowing the distillate to stand to permit the separation of impurities. The clear liquid was then decanted off. The court said in finding that the patent was valid:

"Of course it is elementary that the validity of a process patent containing several steps cannot be assailed by showing any one of the steps to be old. Even where all steps are old, anticipation is not established unless it further appears that the steps (old individually) were employed in relation to one another as disclosed in the patent, the validity of which is attacked."

One of the interesting cases that show the distinction between mechanical and process patents was that involving the delinting of cotton. An inventor had taken out both a process patent and a patent on the machine for doing the work. It developed that the machine was old and common in mechanical and chemical engineering lines, but that the steps of the process carried out on the machine were new. The order of the steps of the process, the time taken, the method of treatment of the materials and the temperature, may constitute a new combination producing a new result which is patentable.

### Use of Alternative Materials Permissible in Chemical Patents

In chemical patents the Patent Office and the courts recognize a different rule of construction in writing chemical claims than that which applies to claims in mechanical cases. In chemical cases it is permissible to use alternatives. One material or its equivalent can be mentioned by name, while in mechanical cases this alternative method of description of the scope of the claim is not permitted. In the construction of claims in chemical cases, the courts are very careful to follow the opinions of experts as to what materials are equivalent to one another, as it is a well-known rule that merely substituting one material for another in a chemical compound may avoid infringement of a claim. The mere omission of one of the elements will avoid infringement, but the substitution of one element for another, if it has the same characteristics and the resulting combination is the same, does not avoid infringement.

To the layman these cases may seem complicated and somewhat contradictory, but from the vast number of chemical patent cases that the courts have passed on, the following rules have been fairly well crystallized:

1. A new combination of elements or a new combination of steps in a process is invention.
2. A process producing a new result and being formed of a new combination of elements or new ways of treating materials may be invention, even though the machines used for carrying out these steps are old and well known.
3. A mere change in materials without securing some new results not naturally inherent in the materials is not invention.
4. The mere application of old devices and processes to new uses in other analogous arts is not invention.
5. The assembly of old elements into a new combination, producing a new result, is invention.
6. In chemical patents the claims can contain the mention of two or more equivalent elements or chemicals. This is not permitted in mechanical patents.
7. To anticipate a patent, the anticipating material, whether a prior use or a prior publication or a prior patent, must disclose the invention without the necessity of explanation or reconstruction to make it fit the patent which is being anticipated.
8. The patent must be so clear as to the disclosure of the method of making the product, its composition or the process that anyone skilled in the art can be guided to produce the result desired, but it need not be a result which is commercial, nor need the process explained be as elaborate as a production program. It is sufficient if a practical way is pointed out of performing the work to get the results desired.
9. If the patent does not give the information which is essential to secure a practical result, such as specifications for differences in size or quantities of materials, it is not valid.

If the manufacturer expects to do an export business there are a number of other rules to watch, but they are too complicated to permit of explanation in so short an article.

## French Import Duty on Aluminum

In the article "Crisis in the French Aluminum Industry," published in our Dec. 8, 1924, issue, p. 893, it was stated that aluminum imported into France had to pay a duty of 2 francs per kilo, times a coefficient of 4; in all, 8 francs per kilo. Two French firms interested in the aluminum industry, Compagnie de Produits Chimiques et Electrométallurgiques Alais, Froges et Camargue and L'Aluminum Français, have called our attention to the fact that this rate is the "tarif général," which applies at present only to Germany, Austria, Hungary, Bulgaria and Turkey. For imports from other countries the "tarif minimum" applies, the rate for aluminum under this tariff being 0.50 franc, times the coefficient 4, or 2 francs per kilo.

## New Potash Deposits in the Pyrenees District of South France

At Castagnede, near Salies-de-Bèarn, in a locality where traces of petroleum were recently discovered, there have been located potash deposits that are thought to be of a considerable importance.

The stratum is found at a depth of 180 meters, the vein of potash salts being approximately 90 meters thick. Analysis of a boring at 213 meters in depth, made by the Campredon Laboratory at Nantes, showed 11.94 per cent of potassium chloride. The deposit is considered as of a commercially workable nature and plans for exploitation are already under way.

# *Longest Belt Conveyor in the World*

## *Success of Remarkable Material Handling Installation Foreshadows a Revolution in Handling Methods*

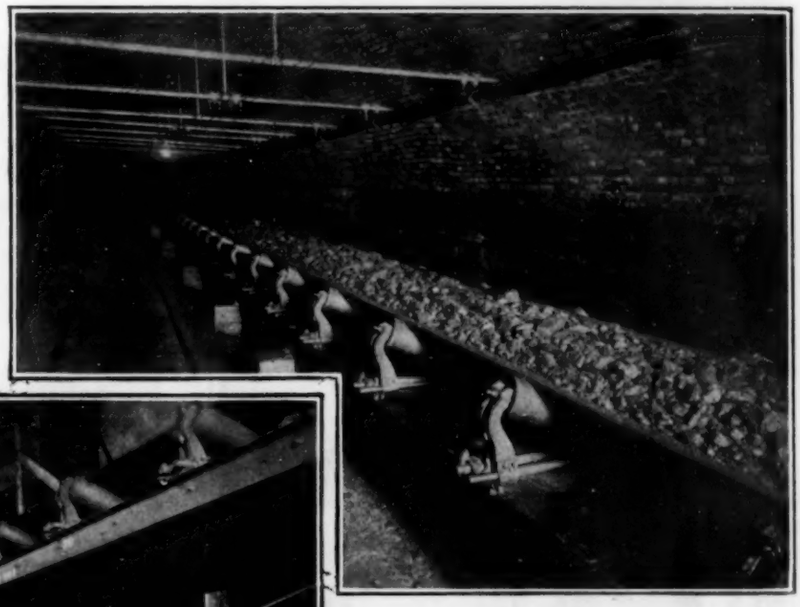
TRY to visualize a belt-conveyor system 4¼ miles in length. It is hard to do. And yet such a system exists and is now in successful operation. This fact is due to the vision and courage of the H. C. Frick Coke Co. This company supplies the coal for the immense byproduct coking plant at Clairton, Pa., transporting it by barge from its mines along the Monongahela River direct to the coal-unloading wharf at Clairton. When the U. S. Steel Corporation decided on the extension of its plant at Clairton, an extension that resulted in the addition of more than 300 Becker ovens to the already huge plant, the Frick company saw that its available coal, close to the river, would not constitute a sufficient supply.

Therefore, the company purchased a mine directly back from the river and close enough to some mines still further removed from the river and already owned by it to permit of a continuous underground passage from an adequate coal supply to the river. It was the intention at first to transport this coal by car and electric locomotive over a mine railway to the river. Study proved that considering the length of the haul, more than 4 miles each way, this scheme would not be practical, as it would require more than 4,000 mine cars to do the work.

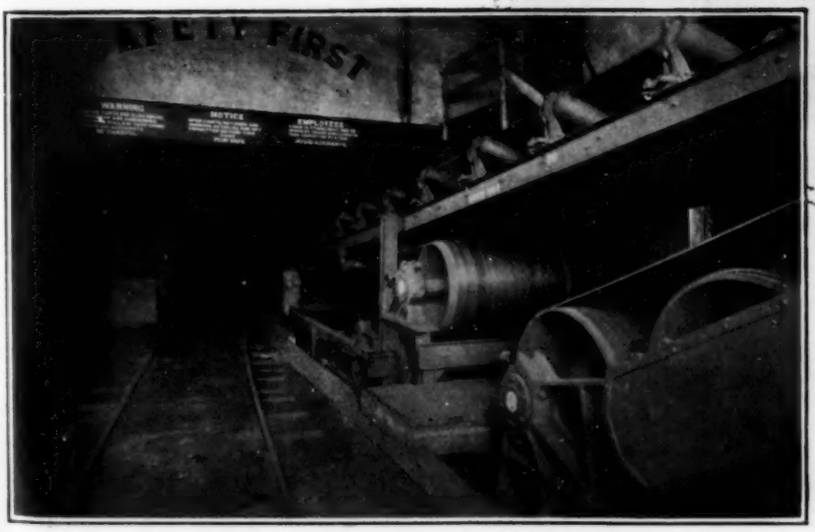
After some study it was decided to move the coal on belt conveyors. The proposed conveyor was worked out and designed with the utmost care, many experts on this method of handling being called upon for advice. Ample time was taken and each step was proved before the next was taken. Finally, it was determined that existing makes of belt were satisfactory, but that carriers would have to be redesigned to meet the service. So all the makers of carriers were asked to submit designs on a three-pulley model of troughing carrier. This number of pulleys was chosen to reduce the number of points needing attention and lubrication, an important consideration when it is kept in mind that there are 6,598 carriers used in the system. The carrier finally adopted is provided with ball bearings and high-pressure lubrication and is so mounted that it may oscillate to take care of inaccuracy of alignment.

The system is now in full operation and is handling upward of 9,000 tons per day. The control is practically automatic and the labor involved in operation, maintenance and supervision is extremely small, while the power consumed amounts to about 0.363 kw. per 100 tons per 100 ft. level or equivalent.

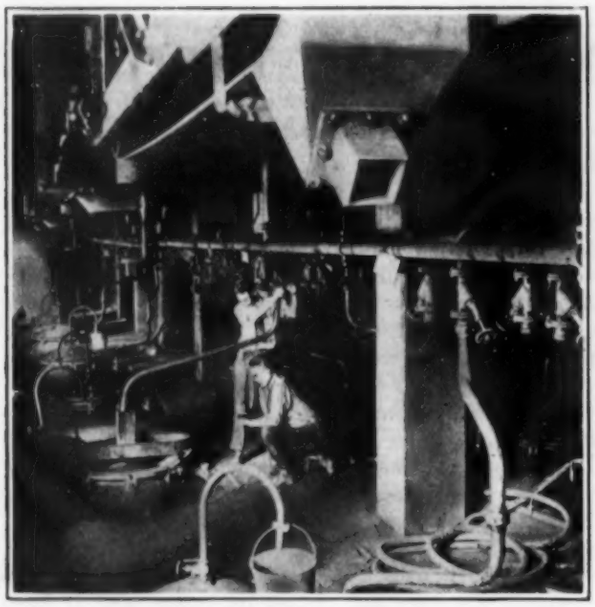
The success of this application of conveyors should serve to arouse general interest in the extension of this method of handling materials, and there is little doubt that other installations of this type will be made.

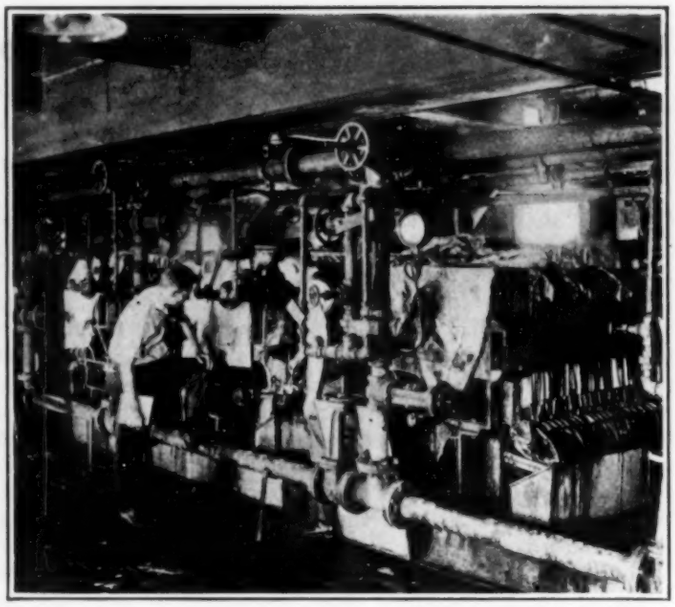


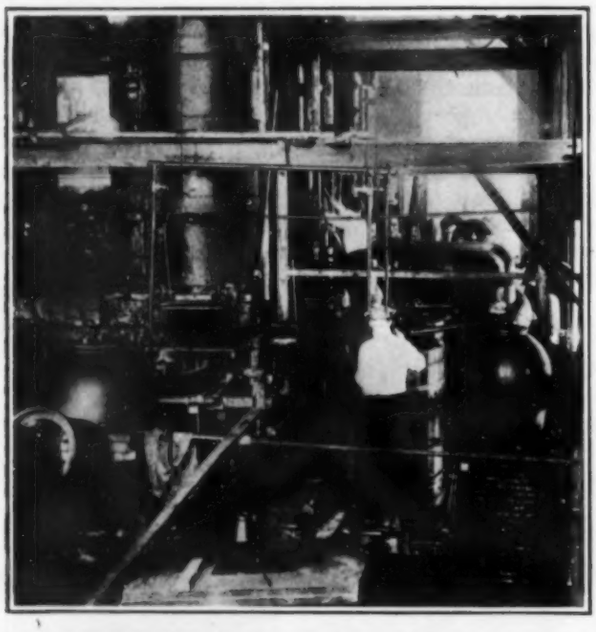
*Below—View of the drive of one section of the conveyor. Drive and head pulleys are 48 in. in diameter, mounted on 7½-in. diameter shafts with split hubs. The shafts are carried in roller bearings and are fixed in accurate alignment. Snub and tail pulleys are 36 in. in diameter, on 5½-in. shafts with similar bearings. The belt is eight-ply, 32-oz. duck, ⅛-in. rubber covered except in two cases, where fabric belts are used.*




*Above — View of conveyor in tunnel, showing the method of construction and type of carrier used. Note the fitting on the carrier through which the lubricating grease is forced into reservoirs in the pulleys at high pressure. The belt, troughed as it carries the coal, returns flat, carried on simple pulleys appropriately spaced beneath the structure.*





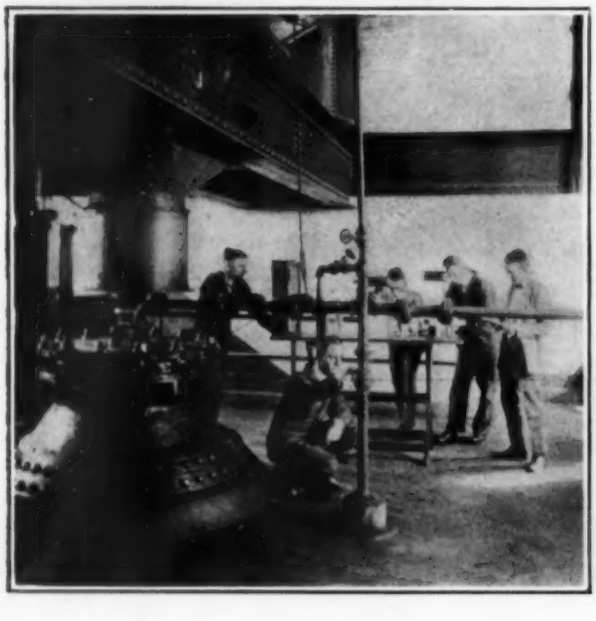


IF A PERSON wants to learn to swim, he usually goes into a body of water and begins to gesticulate in accordance with the advice of someone skilled in the art.

The same relatively simple idea applied to chemical engineering amounted to a revolution. The idea of putting students out in the factory and teaching them chemical engineering where chemical engineering grows and flourishes was unique when it was first carried out at M.I.T.

Here is some photographic evidence of the kind of work done by the students at the field stations. It is investigational work done on units in full operation. It is educational and constructive. It is valuable to the plant and it is real chemical engineering, virile and robust—not an emasculated classroom variety.

The pictures show groups of students at work on various unit processes. At the top, filter presses in the Revere Sugar Refinery and char filters at the same plant. To the left, muriatic acid at the Merrimac Chemical Co. Below, pulp cookers and multiple effect evaporators with groups making test runs.



**The New Buildings of the Massachusetts Institute of Technology at Cambridge, Mass., Looking Across the Charles River Basin From Boston**

# How M.I.T. Makes Chemical Engineers

## At Least Four Unusual Features Make This Course Unique in the Chemical Engineering Field

**By Charles Wadsworth, 3d**
Managing Editor, *Chem. & Met.*

FROM the time when Massachusetts Institute of Technology was opened for business in 1865 until the present moment it has devoted itself wholeheartedly to the task of "supplying a complete system of industrial education and equipping students with every scientific and technical principle applicable to the industrial pursuits of the age." This was the way William Barton Rogers expressed the purpose of the Institute in his famous memorial to the Massachusetts Legislature of 1859, and presumably it will stand as the guiding principle until conditions change fundamentally.

It is not strange, therefore, that when a new technology, chemical engineering, began to come into being, M.I.T. should develop a course to teach the scientific principles upon which this technology was based. It began in an elementary way about 20 years ago in the department of chemistry. In fact this liaison was maintained until 1919, when the department of chemical engineering was created and the curriculum placed in its hands. The intervening years were those in which Dr. William H. Walker, afterward Colonel in the Chemical Warfare Service, molded the course in chemical engineering and stamped it with his personality. Inevitably they were years of compromise and adjustment, but at the end of 15 years it could safely be said that the course represented in large measure Colonel Walker's idea of what chemical engineering education should be. A student of Walker's, Dr. Warren K. Lewis, a distinguished chemical engineer in his own right, took up the leadership of the course in 1919 and has developed it in large measure as a logical extrapolation of the earlier course.

To understand chemical engineering at Tech. it is necessary to differentiate the undergraduate course and the graduate school work, which includes the Research Laboratory of Applied Chemistry and the School of Chemical Engineering Practice.

The 4-year course leading to the bachelor's degree in chemical engineering is designed to give as much fundamental science and as much of the technique of its application as possible in the time allotted. Admittedly there are a great many other subjects that would be valuable to the chemical engineer, such as business administration, accounting, commercial law. Admittedly, too, there is much to be gained from a larger number of cultural subjects (though M.I.T. has more than the average for chemical engineering courses). But in 4 years it is not possible to give more than the essentials in those sciences that are at the root of all chemical engineering and some of the technique of applying these essentials to industrial problems. At least that is the belief at M.I.T. and therein lies the philosophy of the course.

What are the fundamental sciences of chemical engineering? Chemistry, physics and mathematics, and in the M.I.T. course there is an unusually pronounced emphasis on these fundamentals. The charted analysis of the curriculum shows this clearly.

The language requirement is designed to give a fair degree of familiarity with German and some knowledge of French, enough in each case to permit easy reference to the literature. The requirement is somewhat flexible, depending on the languages presented for entrance. If advanced German was presented, the student is still required to take scientific German. If advanced French, he need take no more of it. The 4 hours per week for one year of language seems to concentrate it too much, although it must be admitted that it is by no means a foregone conclusion that two 2-hour courses in successive years would give better results.

The courses in English and history are interesting in that they combine the two subjects advantageously. English composition is taught through the reports on historical subjects. There is some leeway here too, as report writing and other English courses may be substituted if desired. Mathematics proceeds in an orderly way through calculus, and combines well the teaching of analytical geometry with calculus. In addition there is a course in the application of calculus to chemical and chemical engineering problems during the fourth year.

By this time the student will have seen the part that calculus plays in the solution of technical problems and the course is well timed psychologically to appeal to the students for that reason. It is a point worth noting.

Physics is spread over 2 years, probably to distribute the laboratory work more evenly, and the spreading out has much to recommend it. The engineering subjects do not differ greatly from other courses in chemical engineering. The nomenclature differs somewhat, as would be expected. The time devoted to these subjects is a little less than that in some other curricula but there is less of a burden of inevitable and random courses, so that the lower percentage is rather apparent than real. Except for the course in descriptive geometry and the extra heavy dose in applied mechanics, the subjects are germane and essential. Perhaps it might also be fair to call into question the amount of time devoted to electrical engineering. There is, however, a very practical reason for this and it may apply equally well to the applied mechanics course mentioned above. It is not possible to construct courses to take care of the specific needs of individual students or of groups of students. Sometimes it is necessary to utilize a course that is being given already.

The work in chemistry is extremely interesting from the commentator's standpoint. Not including industrial chemistry, which is listed under chemical engineering, more than 20 hours of chemistry out of 72 hours total for this course are required, which amounts to 27.8 per cent. This is distinctly higher than the average for chemical engineering courses. Qualitative analysis is completed in the summer following the first year. It seems to be as good a way of getting rid of qualitative analysis as any, except perhaps merging it with the last part of general chemistry. At M.I.T. the department indorses the course as valuable in familiarizing the student with chemical equations. Quantitative analysis during the second year is supplemented by a 2-hour course in the fourth year. This is a sort of string around the student's finger so that he will be refreshed in the use of analytical methods before he leaves for industrial work. During the third year a course in chemical principles is given. This is straight physical chemistry with special attention to the maximum work obtainable from chemical changes. A large mouthful of organic chemistry and an advanced course in inorganic chemistry complete the list and incidentally give the student in chemical engineering more chemistry than students in chemistry usually get.

Chemical engineering is notable for several reasons. It is confined to two courses, which in itself is unusual, but those two courses are, in my opinion, the most outstanding courses ever given on the subject. The first was developed gradually over a period of years and finally became known to the world in a book, entitled "Principles of Chemical Engineering," by Walker, Lewis and McAdam. At M.I.T. and through this course was presented the clearest and one of the first pictures of what constituted chemical engineering. It was not simply industrial chemistry but a new technology of unit processes operated with physico-chemical control. The book marks a new era characterized by a clear conception of chemical engineering.

The other course, industrial chemistry, is in a sense complementary. It does not consist of a series of lectures on the manufacturing methods of American industry. The descriptive matter is almost incidental to a discussion of the underlying physical chemistry of each industry, and the quantitative problems dealing with industrial calculations, although difficult, are of tremendous practical value. It is a course in applied physical chemistry, which we have professed again and again to be the very heart and substance of chemical engineering.

Only one other subject need be discussed in the undergraduate course, and that is the thesis. This must occupy at least 170 hours during the last half of the fourth year and during this time the student must demonstrate his ability to use his previously acquired knowledge of chemistry and chemical engineering. The subject of the thesis is usually on some phase of chemical engineering, though by no means restricted to that. Many elect a straight chemical problem and some a problem on engineering less closely allied to chemical engineering. The four credit hours could be credited to chemical engineering on the curriculum without serious error.

The graduate work in chemical engineering may be divided for simplicity into three main parts. There are, first, the courses of instruction; second, the Research Laboratory of Applied Chemistry, and third, the School of Chemical Engineering Practice. The courses of instruction are of two general classes: those dealing with a unit process such as flow of heat, evaporation, drying, combustion, etc., and those dealing with some phase of industrial chemistry, such as colloid chemistry, applied thermodynamics or with a single industry. The tendency is for students who intend to enter industrial research to take up research work in the Laboratory of Applied Chemistry and for those who plan to take up engineering work to go to the School of Practice.

The Research Laboratory of Applied Chemistry was originally organized for the purpose of giving students the opportunity of carrying out industrial research. To bring this about co-operative agreements have been negotiated with more than twenty industrial concerns which provide that annual retainers be paid for research work on specific problems. During 1924, the laboratory received $65,000 for such work, and this sum was available for fellowships and apparatus. Much of the work of the laboratory is published as soon as it is completed. As a whole, it affords an opportunity for training in research that is unusual.

The School of Chemical Engineering Practice is even more unusual and is probably the most important sin-

This is the second article of the series on chemical engineering education. The purpose of the series is to study modern tendencies in chemical engineering education and to project if possible the kind of man that will be available for and dominant in the chemical engineering industries a decade hence. Perhaps also the chemical engineer in industry will benefit by having recent advances called to his attention. Later on a list of reference books used in chemical engineering courses will be published with this same end in mind. The first article, "Chemical Engineering at Michigan," appeared Dec. 29, 1924. Other articles will follow.

gle development in the field of chemical engineering education. Chemical engineering practice would mean, of course, handling unit process equipment on a large scale. This would be impossible in a university except by the expenditure of large sums of money, and the space occupied would be out of proportion to the benefits derived. What then? Take the students into the plant and let them learn from a piece of equipment actually in use. That is the plan at M.I.T.

The conception is sound. The chemical engineer graduating from the average course is like the young doctor fresh from medical school. The School of Practice was conceived as a kind of clinical experience for the chemical engineer. Its aim is to give the student the experience acquired formerly through employment in industrial plants. From the very nature of things this practical experience was a narrow development. It lacked balance and it was slack. The School of Chemical Engineering Practice aims to correct these faults.

Field stations of the school have been established at three industrial centers, Boston, Buffalo and Bangor. At each station there is an assistant professor and an instructor in charge of the work. Students are selected for the school so that those taking its course represent a high average of intelligence and capacity. At the Boston station work is divided between the Revere Sugar Refinery and the Merrimac Chemical Co. At Buffalo the Lackawanna plant of the Bethlehem Steel Co. is the center of activity, and at Bangor the Eastern Manufacturing Co. and the Penobscot Fibre Co. are the cooperating plants. Each station is the headquarters of a student for 8 weeks, so that during 24 weeks he will have had contact with iron, steel, coke, benzol, sulphate of ammonia, sugar, heavy chemicals and acids, various kinds of pulp and paper, chlorine and caustic soda.

But he does not study the manufacturing process from an industrial chemistry standpoint. Except in the first week at a given station, when he constructs a flow sheet of the manufacturing processes, the student's time is occupied in the study and investigation of unit processes from the viewpoint of chemical engineering. The whole group at a given station, numbering about twelve, carries out the first problem together. From this each learns how to plan an investigation, how to get data, how to select data intelligently and how to calculate the results. After this several other group tests are carried out and then individual plant investigations are made. It should be remembered that so far as possible the student designs and carries out the test.

There is only one difference between the work at the School of Practice and plant work after the student has entered industrial work as a chemical engineer. It lies not in the technical phases of the work at all, but in the relations of the individual with the personnel in the plant. In other words, a student graduating from the School of Practice might be led to assume that technical investigation in a manufacturing plant was taken for granted as essential. He might forget that there is frequent hostility to technical investigation on the part of production men. It is obviously and from the very nature of things impossible to give students this kind of experience, but it is more than half the battle to make them realize that it exists.

This is, then, the background and the outline of chemical engineering at M.I.T. It is impressive on paper and when vitalized by the personalities of the staff it is even more impressive. There is perhaps some danger in accepting any man's indorsement of chemical enginering at M.I.T. His endorsement may arise from a hearty agreement with the point of view or from a liking for the personalities involved. Therefore do not accept any enthusiasm either at face value or even at a discount, but judge by results—by the record of M.I.T. men in chemical engineering work.

| | 1st Year | 2nd Year | 3rd Year | 4th Year | Total | |
|---|---|---|---|---|---|---|
| English | And History 3 | And History 3 | | Engineering English 1 | 7 | 9.6 |
| Mod. Lang. | | German or French 4 | | | 4 | 5.5 |
| Economics | | | Elementary 1 | | 1 | 1.4 |
| Physics | Statics, Kinetics & Light 2 | Electricity & Heat 2 | | | 4 | 5.5 |
| Mathematics | Anal. Geom. & Calculus 3 | Calculus 2 | | Applications of Calculus 1 | 6 | 8.2 |
| Chemistry | General Chemistry 4 | Quantitative Analysis 3 | Physical Chem. 2<br>Organic Chem. & Lab. 5 | Analytical Chem. 2<br>Inorganic Chem. 2 | 20 | 27.4 |
| Engineering | Descriptive Geom. 1<br>Mach. Drawing ⅔<br>Mechan. " ⅓ | Mechanism 1<br>Study of forms and motions of mechanisms, belting, screws, cams, gear teeth etc. | Applied Mechanics 1<br>Heat Engineering 3<br>Electrical Eng. 1 | Applied Mech. 2<br>Elec. Eng. and Lab. 1⅓<br>Eng. Lab., Testing Mat., Foundry & Shop 1⅓ | 12⅔ | 17.4 |
| Chem. Eng. | | Problems of Chem. Eng. ⅓ | Industrial Chem. 3 | Chem. Eng. 3<br>Indus. Chem. & Lab. 1 | 7⅓ | 10.0 |
| Miscellaneous | Military Science 3<br>Physical Training 1 | Military Science 3 | | Thesis 4 | 11 | 15.0 |
| Total | 18 | 18⅓ | 16 | 18⅔ | 73 | 100.0 |

Qualitative Analysis 2 (during summer following first year)

The chart represents a detailed analysis of the course in chemical engineering at M.I.T. The numbers following the names of the courses stand for credit hours per week for a full year. It was necessary to translate a three-semester system into the above scheme and consequently the numbers cannot be indorsed as rigidly accurate, but will serve their purpose adequately. The right-hand column of figures under "Total" represents per cent.

# Activated Char for Gold Adsorption

## A Study of the Various Methods of Activation Revealed a New Class of Carbons Having Unusual Metal-Adsorbing Properties

**By Ralph H. McKee and Paul M. Horton**
Department of Chemical Engineering, Columbia University, New York City

CARBON has long been advocated as a precipitant for gold from aurocyanide liquors, as the advantages of this agent were early recognized. However, due to erroneous ideas concerning the mechanism of this precipitation, no attempts were made to increase the precipitating power by increasing the adsorptive properties of the charcoal. It is the purpose of this article to draw attention to the manner in which charcoal responds to the various treatments employed for activation for this specific use.

The early investigators (1)* in this field assumed that the gold was reduced by chemical action, and in the case of gold chloride solutions the following reaction was assumed:

$$4AuCl_3 + 6H_2O + 3C = 4Au + 12HCl + 3CO_2$$

But since only about five-hundredths of the theoretical amount of carbon dioxide was evolved, the theory was abandoned. Recent work in this line (2) indicates that any carbon dioxide evolved is simply due to displaced gas liberated by immersion in the solution. If the char is previously boiled with water to eliminate the adsorbed gases, no carbon dioxide is evolved, although the gold is equally well precipitated.

Black ash residue, a waste product of the soda pulp industry, can, when properly treated, replace zinc in the usual cyanide process of gold recovery. Contrary to general opinion, a special form of char can be produced especially activated for metal adsorption. By the use of water-soluble alkaline-impregnating agents a char is produced capable of adsorbing 2,000 Troy ounces of gold per ton of char.

For a time it was believed that cyanide solutions "poisoned" the carbon and that adsorption of gold from such solutions would therefore be impossible. How this idea arose is not clear, as it has since become apparent that gold can be very well removed from aurocyanide solutions by charcoal.

The carbon-monoxide theory (2) was next evolved and has largely held the stage up to the present time. This theory will not be discussed except to note that it has no chemical or experimental foundation, and that removal of carbon monoxide improved the char rather than diminished its precipitating power.

A. W. Allen (*Chem. & Met.*, 1918, vol. 18, p. 642) advanced the hypothesis that the gold is adsorbed in the form of the compound $KAu(CN)_2$. The reasons advanced by him in support of this idea are entirely valid, but likewise apply to other adsorptive processes. However, this step is in the right direction, as it eliminates the idea of precipitation due to chemical reduction or to the formation of special chemical compounds.

In a solution of AuCN in KCN, among several, the following equilibria exist:

$$KAu(CN)_2 = K^+ + [Au(CN)_2]^-$$
$$[Au(CN)_2]^- = Au^+ + 2CN^-$$

and it is evident that it would be possible to have adsorbed any of the various ions or compounds present. In the preceding articles it has been shown that the adsorption of copper by charcoal decreases when the copper is bound in a complex ion. Thus when a 0.05 molar copper sulphate solution is tested according to the standard procedure, approximately 27 per cent of the copper is removed from solution, whereas only 10 per cent is removed if the solution contains excess ammonia, and only traces of copper are taken up if the solution contains an excess of potassium cyanide. Although the total copper concentration of these solutions is the same in each case, the copper-ion concentration decreases when we add ammonia, and becomes almost negligible when an excess of cyanide is present. It appears, therefore, that as the concentration of the copper ions is decreased the adsorption is decreased, other factors being held constant. This same situation exists with regard to gold salts, as the metal is more easily withdrawn from the chloride solution than from the cyanide. Furthermore, the very stable auric cyanide furnishes so few gold ions that the metal is practically unadsorbed when in solution as the -ic cyanide. The metal is removed from solutions of aurocyanide, however.

There is some evidence that metal adsorption by charcoal is a combination of both molecular (equivalent) and ionic (hydrolytic) processes, and that as the metal becomes more noble the hydrolytic becomes the more dominant factor in adsorption. For various reasons, then, it might be expected that gold would precipitate chiefly as the metal from aurocyanide solutions, except at the beginning of adsorption, when a certain amount of compound would be taken up.

### Proving the Theory

In order to test this point experimentally it is necessary to show that the concentration of the cyanide in solution varies in one of two ways:

(*a*) The cyanide concentration decreases throughout the time of adsorption and proportionally to the amount of gold removed.

(*b*) Or decreases at first but not during the major portion of the period of adsorption.

If (*a*) were shown to be true, then the gold is adsorbed as a compound or complex ion as postulated by Allen, but if (*b*) were demonstrated, then a combination of both equivalent and hydrolytic adsorption is the only explanation.

However, it is not practical to settle these points definitely by any such simple means, since the accuracy

*Numbers refer to references at the end of this article.

of our methods for determining free cyanide will not permit the measurement of the extremely small concentration changes involved. On the large scale the loss of cyanide through oxidation or volatilization is sufficient to render accurate measurement impossible. Hence a different method of proof must be employed.

When a solution of silver nitrate is treated with an alkaline char the silver is precipitated on the char in white metallic form, the char when in suspension having a remarkable luster in contrast to the ordinary dull black appearance. This is also observed with gold chloride solutions, the char partaking of a gold-plated appearance. A specimen of char weighing 1.000 gram after having adsorbed 64 mg. of gold from aurocyanide solution also showed the characteristic color of metallic gold. This metal is not extracted from the char by hydrochloric acid. Even in such relatively concentrated solutions as 0.01 molar copper sulphate the acid adsorbed is only about 50 per cent of the equivalent metal adsorbed. This constitutes the first step toward the belief that the gold is adsorbed as the metal from dilute aurocyanide solutions.

In Fig. 1 is plotted the adsorption curves for copper from sulphate solutions, silver from nitrate solutions,

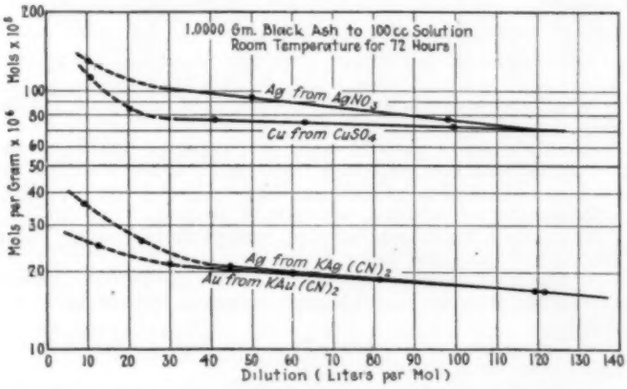

1.0000 Gm. Black Ash to 100 cc Solution
Room Temperature for 72 Hours
Ag from AgNO3
Cu from CuSO4
Ag from KAg(CN)2
Au from KAu(CN)2
Mols x 10⁶
Mols per Gram x 10⁶
Dilution ( Liters per Mol )

**Fig. 1—Adsorption Curves for Copper, Gold and Silver From Various Solutions**

It will be observed that the greater deviations between silver and copper (from nitrate and sulphate solutions respectively) and silver and gold (from cyanide solutions) occur at the higher concentrations. The different acid radicals may account for the greater deviation between the copper and silver. It will be noted that the gold and silver curves practically overlap except at the higher concentrations.

and both gold and silver from cyanide solutions. The results are plotted on a semi-logarithmic scale, as this form gives the nearest to a straight-line graph. In plotting the values of the copper adsorbed from the sulphate solution, the analytical values have been multiplied by 2 in order to reduce the data to a monovalent basis of comparison.

It will be noticed that as the solutions tested become less concentrated the metal adsorbed per gram of char, when expressed in mol equivalents, approaches the same value for both copper and silver. The effect of the acid radical, which probably accounts for the deviations observed at higher concentrations, also becomes less. In the case of silver and gold adsorbed from the cyanide solutions, the two curves practically overlap, except at the higher concentrations. The relative amounts of silver adsorbed from the nitrate and cyanide solutions at equivalent concentrations bear the ratio of approximately 50 to 1 and since the two curves are parallel, the actual mechanism of adsorption is likely the same in both solutions—the actual amount of silver adsorbed being proportional to the silver-ion concentration (activity) in the two solutions. Furthermore, in the case of copper it is observed empirically that the valence of the ion comes into consideration, which would not likely be the case unless the copper is adsorbed as the metallic ion. This constitutes the second part of our reasoning in favor of the assumption that both gold and silver are adsorbed chiefly in the metallic state, especially from solutions of low concentrations as are found in commercial cyanide practice. At higher concentrations there is no doubt that some of the metal is adsorbed in the form of a complex ion or molecule. A commercial cyanide liquor carrying about ½ oz. Troy of gold per ton liquor corresponds to a dilution of nearly 11,500, whereas the most dilute solution we were able to measure accurately corresponded to a dilution of 120. (Fig. 1.)

In preceding articles (see *Chem. & Met.*, vol. 32, Nos. 1 and 2, pp. 13 and 56) it has been indicated that an alkaline-treated char is a very effective metal precipitant. This is a new development, although the effect of alkali on carbon has been known for some time. Haber and Brunner (4) state that wood charcoal dissolves in fused caustic at 500 deg. C. to form carbonate and hydrogen, and Glassner and Suida (5) show that heating wood char with potassium carbonate increases the adsorptive power for the dyes, crystal violet and crystal ponceau. They believed that the effect was due to the formation of cyanide compounds, because the increase was much less when heated with carbonate in a stream of carbon dioxide.

The actual presence of cyanide in these chars has not been demonstrated, hence the effect of carbon dioxide is likely due to the increased stability of the carbonate under such conditions, thus reducing the chemical effect on the surface of the char. Since the peculiar properties of the alkaline chars are not developed by simple treatment with alkaline solutions at the ordinary boiling temperature (or even in an autoclave), it is reasonable to conclude that the surface of the carbon is to some extent modified by the drastic treatment at higher temperatures, either through chemical action or by the adsorption and stabilization of certain ions.

## Determining Adsorptive Capacity

It is clearly recognized that different kinds of wood yield chars of varying precipitating power. As has been suggested, this may be due to variation in the tannin content of the wood, although the alkaline-ash content is probably a more important factor.

The results obtained in the authors' tests, therefore, are not to be taken as limiting values, but merely as approximations of the way in which charcoal will respond to various methods of treatment intended to improve the precipitating power.

According to Clevenger (6) the limits encountered in cyanide metallurgical practice are about: Free cyanide by "Liebig's test," 0 to 0.25 per cent; gold content, up to 0.5 oz. per ton liquor; silver content, up to 10 oz. per ton liquor. If gold be taken as $20.67 per oz. and bullion at $20 per oz., a testing solution containing 0.0171 gram per liter = 0.5 oz. per ton of liquor = $10 per ton value. Also the lower limit of $0.02 per ton = 0.000034 gram per liter.

The adsorptive capacity of the char is determined as follows: The sample to be tested, weighing usually 2.0000 grams, is boiled with a small amount of water to expel air and hence prevent channeling, is cooled and poured into a special filter tube, through which the

excess water is sucked out. The filter tube is made of glass, ¾ in. in diameter with a perforated glass plate fused in place about 7 in. from the end. A glass stopcock is fused to the tube also. A circular piece of canvas is used as the filter cloth. The thickness of the cake varies with the density of the char, but runs from 1¼ to 2 in. in thickness. The gold solution is sucked through at a rate of about 400 c.c. per hour. The filtrate passing through is collected and measured. When experience indicates, the filtrate is tested for the gold content. When about 10 per cent of the gold in the testing solution begins to run through in the filtrate, the test is discontinued, the char washed out of the tube, filtered and again placed in position for a continuation of the test. It will be found that a further quantity of gold will be adsorbed before any begins to run through in the filtrate. This procedure is repeated until the solution begins to pass though the char immediately after the sample has been replaced in the tube. The increased capacity due to this procedure is simply due to the fact that new char surface is brought into play each time.

Attempts to revivify the char by sucking air through the moist cake, drying at 100 deg. C. and ignition to red heat were found to be ineffective. In fact, a loaded char after ignition will give up its gold content to the cyanide solution.

### Calculating Amount of Gold Adsorbed

The total amount of gold adsorbed by the char is computed from the volume of solution cleaned. In order to convert the weight of gold adsorbed into workable units the following factors have been employed: Wt. Au in mg. per gram char × 29.2 = wt. Au in Troy oz. per short ton char, or × 32.6 = wt. Au in Troy oz. per long ton char. Also for practical purposes we may multiply the weight of char in grams required to clean a given volume of liquor (liters) by 2 in order to convert to pounds of char required per long ton of liquor of same concentration. Thus, if 1.0000 gram char removes the gold from 2.5 liters of solution, 2 lb. of char will remove the gold from 2.5 tons of liquor of the same concentration.

The method used for determining the amount of gold in the filtrate from the char is briefly as follows: (1) 500 c.c. (or less) sample is placed in a 750-c.c. wide mouth bottle. (2) 15 c.c. saturated solution of sodium cyanide added. (3) 2 drops of saturated lead acetate solution added. (4) 1 gram 200-mesh zinc dust sprinkled in. (5) Shake violently for 2 minutes. (6) Allow precipitate to settle and decant liquor. (7) After washing, transfer precipitate to beaker and digest with dilute hydrochloric acid to remove zinc. (8) Wash residue free from zinc salts. (9) Dissolve residue in 5 c.c. of dilute aqua regia, evaporate to 2 c.c. and cool. (10) Dilute to 10 c.c. in ¾-in. test tube and add stannous chloride dropwise (2 to 5 drops). Color develops in 30 seconds and ranges from slight yellow to pink and blue. The color is fairly stable. It is not necessary to filter out the lead-chloride crystals.

The stannous chloride solution is made by dissolving stannous chloride crystals in 10 per cent hydrochloric acid to give a 12.5 per cent solution, which is preserved over metallic tin. The dilute aqua regia contains 100 c.c. of concentrated hydrochloric acid, 10 c.c. concentrated nitric acid and 100 c.c. water.

The average color range with known amounts of gold is shown in the following table:

0.000050 gram gold...Looking down tube shows slight pink
0.000100 gram gold.....Decided pink
0.000300 gram gold .....Light blue
0.000600 gram gold.....Dark blue, cannot see down tube
0.001000 gram gold.....Very dark blue

The best results are obtained in the pink to blue range.

### Experiments With Gold Adsorbents

Experimental data showing the effect of various modes of treatment upon the metal precipitation power of the chars are summarized as follows:

Experiment 1. Material: Leached black ash residue, rewashed and dried. Sample, 2.0000 grams. Sized through 90 mesh and on 100 mesh. Solution 17.15 mg. Au per liter. Free cyanide = 0.26 per cent.

| Volume of Filtrate, c.c. | Au Treated, mg. | Au Adsorbed, mg. |
|---|---|---|
| 1,200 | 20.58 | 20.41 |
| 700 | 12.00 | 11.83 |
| 300 | 5.15 | 4.98 |
| 100 | 1.71 | 1.54 |
| Total..... | | 83.76 |

Au per gram char = 19.38 mg., or equal to 632 oz. Troy per long ton char.

| Experiment No. | Mg. Au Per Gram Char | Troy Oz. Au Per Long Ton Char |
|---|---|---|
| 2 | 26.1 | 850 |
| 3 | 59.52 | 1,940 |
| 4 | 8.32 | 271 |
| 5 | 15.95 | 520 |
| 6 | 25.57 | 834 |
| 7 | 42.45 | 1,384 |

In all experiments 2 to 7, sample used = 2.0000 grams char.

Sample sized to pass 90 mesh and retained on 100 mesh.

Testing solution contained 17.15 mg. Au per liter. Free cyanide by titration = 0.26 per cent.

Treatment of samples previous to testing:

2. Leached black ash residue, heated to 900 deg. C. for 1 hour and quenched hot.

3. Leached black ash residue, heated with sodium carbonate to 900 deg. C. for 2 hours, quenched hot, washed and dried.

4. Crude pine char, heated to 900 deg. C. for 2 hours and cooled in covered crucible.

5. Crude pine char, heated to 900 deg. C. for 2 hours, quenched hot, filtered and dried.

6. Crude pine char, heated with 10 per cent sodium carbonate for 2 hours at 900 deg. C., quenched hot, washed and dried.

7. Pine char made by impregnating pine sawdust with saturated solution of sodium carbonate, and then heating progressively to 900 deg. C. and quenched hot, washed and dried.

### Demonstrated Value of Alkaline Chars

The preceding experiments 1 to 6 summarized the results of tests on two classes of chars—namely, an alkaline impregnated char (black ash residue) and a crude primary wood char (pine sawdust char). The results show that the alkaline char is superior at every stage, although the crude pine char after being heated to 900 deg. C. and quenched hot exhibits considerable metal-precipitating power. Treatment with sodium carbonate at about 900 deg. C. followed by hot quenching in water gives products much superior to any hitherto used in commercial cyanide practice. The specially treated black ash residue with a capacity of around 2,000 Troy oz. per ton char is well within the requirements of a commercial char. If the pine sawdust is saturated with sodium carbonate solution before charring and then heated to 900 deg. C., the resultant char is extremely efficient.

Since the best previous results obtained with char in cyanide practice by using a specially quenched and wet ground material (7) range around 770 oz. per

ton of char, the beneficial results obtained by treatment with sodium carbonate both before and after charring are clearly illustrated in the preceding table.

Tests made upon solutions containing both silver and gold show that as the metal concentration is increased the break point occurs at slightly lower capacities. However, the total precipitating power is practically unchanged. The results of two tests in this connection may be summarized as follows:

Experiment 8.
Material; black ash residue, heated with 10 per cent sodium carbonate to 900 deg. C. for 2 hours, quenched hot, washed and dried.
Sample 2.0000 grams, sized through 90 and on 100 mesh.
Solution; 17.15 mg. Au and 35.00 mg. Ag per liter.
Free cyanide by titration = 0.27 per cent.
53.96 mg. total metal adsorbed per gram char.
1,759 Troy oz. metal per long ton char.
Silver came through first, no gold in filtrate.

Experiment 9.
Material: same as above.
Sample 4.0000 grams sized as above.
Solution 17.15 mg. Au and 171.5 mg. Ag per liter.
Free cyanide by titration = 0.25 per cent.
39.15 mg. total metal adsorbed per gram char.
1,276 Troy oz. metal per long ton char.

In both experiments 8 and 9 the test was stopped when 10 per cent of the silver in solution appeared in the filtrate. The total capacity to saturation is much higher, but could not be determined accurately on the small scale.

### Large-Scale Application

The technical problems involved in the adaptation of char for removal of gold and silver from cyanide liquors appear to have been met successfully in hydrometallurgical plants in Australia and South Africa (8). The use of lump charcoal is not feasible, because of the low efficiency and the bulk of material to be smelted. The latest practice involves wet grinding of the char and forming a cake of the ground material on the leaves of a leaf filter. The liquor to be treated is pulled through several units in succession, the strongest liquors meeting the partly loaded char and the weakest liquor the fresh char. The cakes are dropped at intervals and re-formed, bringing new surfaces into action and materially increasing the capacity of the char. After washing and drying, the cakes are burned to remove the carbon, and the ash is collected and smelted with a special flux.

Whether charcoal will replace zinc will be a question of local conditions. When a very foul liquor is being treated, char will be cheaper than zinc under most circumstances, since the bullion is more easily refined and is valued at $2 to $3 per ounce higher than that produced with zinc. This is especially true with liquors running high in antimony and arsenic. In isolated localities where wood is plentiful the char process can replace zinc at about one-half the cost. Other factors also influence the choice in certain plants. Among those favoring the use of charcoal are:

(1) The gold can be more completely removed from foul liquors.
(2) Higher grade bullion is produced.
(3) The refining cost is less.
(4) No fouling agent is introduced into the solution.
(5) Cyanide consumption is less.
(6) Cyanide concentration may be less.

In general the advantage to be gained by the use of char are such that with more efficient chars available the industry will undoubtedly take more interest in this very promising new development. The use of black ash residue in this field will afford an outlet for a very troublesome waste product of the paper industry. However, efficient char can usually be made locally from materials available and at a low cost.

### References

(1) Konig, *Chem. News*, vol. 45, p. 215 (1882).
(2) Green, *Trans. I. Min. & Met.*, vol. 27, p. 316 (1914).
(3) Allen, *Chem. & Met.*, vol. 18, p. 642 (1918).
(4) Haber and Brunner, *Z. Elect. Chem.*, vol. 10, p. 697 (1904).
(5) Glassner and Suida, *Liebig's Ann.*, vol. 357, p. 95 (1907).
(6) Clevenger, *Trans. Am. Electrochem. Soc.*, vol. 28, p. 263 (1915).
(7) Edmands, *Bull.* Inst. Mining Met., London, March, 1918.
(8) Walton, *Rep. Dept. Mines*, West Australia, 1916.

# The Ceramic Society

**One of a Series of Notes on the Development and Present Status of Various Technical Societies**

THE CERAMIC SOCIETY was the direct outcome of informal discussions between students and teachers of the pottery classes organized in 1899 at the Victoria Institute, Tunstall, Staffordshire (England), by the late W. Jackson. Gatherings took place for some time without any semblance of formality, but in 1900 the North Staffordshire Ceramic Society was definitely formed, and periodical meetings were henceforth held in a more regular way. The name was altered in 1903 to the English Ceramic Society, and in 1916 it was once more changed to the Ceramic Society.

Mr. Jackson served for several years as honorary secretary to the society, but was elected president in 1905. Other early presidents of note in the ceramic world were William Burton, Bernard Moore, J. P. Holderoff, Henry Watkin and the late L. Solon. Among the more prominent of those associated with Mr. Jackson in founding the society—in addition to some of those just mentioned—were R. H. H. Jones, F. Turner, Arthur Heath, A. Leese, H. E. Wood and A. G. Richardson. Mr. Richardson is president for the current session, and Messrs. Leese and Wood have occupied that position in previous years.

Mr. Jackson was followed as honorary secretary by the present occupant of that post, Dr. J. W. Mellor, the well-known principal of the pottery department of the Central School of Science and Technology, Stoke-on-Trent, where the Ceramic Society has had its headquarters for many years. In 1916 the late Mr. Solon's famous ceramic library was acquired, and this, in conjunction with the extensive library of the Ceramic Society, forms an exceptionally fine collection of literature on ceramics. Before the end of 1916, a refractory materials section was added to the society, and in 1918 an art section was formed. Starting with the second year, an annual volume of transactions has been published.

No membership qualifications have been imposed other than interest in the aims of the society. Membership is classified as follows, the dues varying as indicated: Honorary members, 6; ordinary members, individual, 557 (25s.); ordinary members, collective or company, 98 (42s.); students, 15 (5s.); total 676.

# Coke Output Recuperates in 1924

## Last Few Months of Year Showed Vigorous Activity After a Poor Summer

**By R. S. McBride**
Assistant Editor, *Chem. & Met.*

IN 1924, as during previous years, production of coal products followed closely the activity or depression in the iron and steel industry. During the first 4 months of the year production of byproduct coke and coal byproducts continued at approximately the record rate of the previous year, but a slackening of the carbonization industry accompanied the lowered activity of the steel industry during the summer and fall. The year closed, however, with renewed activity and an estimated monthly rate of byproduct coke production approximately equal to that of the record year, 1923. During the year the output of beehive coke suffered a similar depression, extending from May through almost to the end of the year; but even the more active months failed to attain a beehive coke production equal to the average of 1923.

The output of oven gas, tar, ammonium sulphate and crude light oil in 1924 was less than in 1923, almost in proportion to the lowering of coke production in byproduct ovens. The markets for these products were adequate throughout all parts of the year to absorb gas, tar and light oil about as usual and the sulphate market was even more satisfactory, affording prompt opportunity for shipment especially during the latter third of the year.

During 1924 approximately 68,500,000 tons of coal was carbonized, about 70 per cent in byproduct ovens, 22½ per cent in beehive ovens and 7½ per cent in retort coal-gas plants. No figures are available for the yields of the various products except for coke, but dependable estimate can be made on the assumption that the yield of the other products was about in the usual relation to the yield of coke. On this basis the following estimates for 1924 are made, including the U. S. Geological Survey figures for byproduct and beehive coke production.

The comparison of 1924 coking activity with that of other recent years is best made on the basis of the coke production. Data are given in the accompanying diagram which show the yearly variation in beehive-oven, byproduct-oven and retort coal-gas plant output. As indicated above, the output of the various byproducts varied almost in proportion to the production of byproduct coke.

Analysis of monthly production data indicates that the variation in beehive coke output from minimum month to maximum month was just the same as the variation in tonnage of byproduct coke from minimum to maximum month. But in the case of beehive coke the minimum month was only one-third of the maximum, whereas in the case of byproduct coke the minimum month's production was three-quarters of that in the maximum month. These facts confirm the interpretation of 1921 and 1922 data—namely, that the beehive coke-oven capacity of the United States now affords simply a balance wheel for the coke industry as a whole.

**Table I—Estimated Production of Coal Products in 1924**

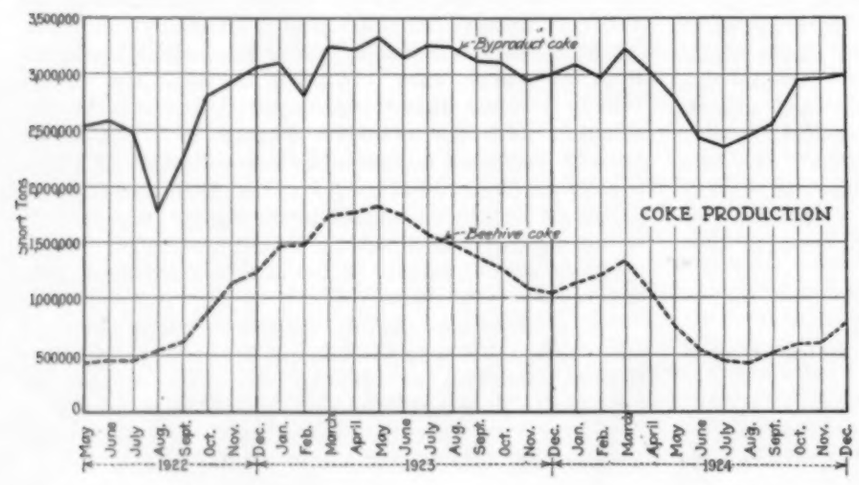
| | |
|---|---|
| Coke: | |
| Byproduct, tons | 33,600,000 |
| Beehive, tons | 9,600,000 |
| Gas-works (surplus only), tons | 1,800,000 |
| Total, tons | 45,000,000 |
| Gas: | |
| Byproduct, M (thousand cu.ft.) | 535,000,000 |
| Gas-works, M (thousand cu.ft.) | 45,000,000 |
| Tar: | |
| Byproduct, gallons | 395,000,000 |
| Gas-works, gallons | 50,000,000 |
| Ammonia: | |
| Byproduct, tons (sulphate equivalent of all forms) | 520,000 |
| Gas-works, tons (sulphate equivalent of all forms) | 25,000 |
| Light oil (crude): | |
| Byproduct, gallons | 120,000,000 |
| Coke breeze: | |
| Byproduct, tons | 2,900,000 |
| Beehive (recovery only), tons | 200,000 |

There is some variation in byproduct-oven output, but the percentage variation is smaller, most of the variation in the demand for coke being met by shutting down or starting up additional beehive ovens. It should be remembered, moreover, that change in rate of production of beehive coke has no offset whatsoever upon the output of gas, tar, ammonium sulphate or light oil, since these products are recovered only at byproduct plants.

### Gas Output and Disposition

The output and value of retort coal-gas in 1924 was substantially that of previous years. Practically all this gas is used for city supply by public utility companies. The beehive oven of course produces no salable gas. The production of gas at byproduct ovens and its disposition in 1924 was undoubtedly approximately in the same relation to the coke output as in the preceding year, although there was during 1924 an unestimated but definite tendency toward greater use of byproduct-oven gas for city supply.

The increase in use of byproduct-oven gas for city supply resulted from two important factors. The first was increasing installation of byproduct ovens by gas companies themselves or for supply of gas to these companies. The second was the increasing use of producer gas or blue-water gas for firing coke ovens in order to make practically all of the gas produced available as surplus for sale.



# The Reward of Courage

## The Perkin Medalist for 1925 Combines Unusual Ability With Courageous Persistence

***Hugh Kelsea Moore***

*Technical Director, The Brown Co., Berlin, N. H., and Perkin Medalist*

MODERN BUSINESS has evolved many curious and ineffective tools. Among them is the so-called progress report. It is designed to keep executives in close touch with the development of a project. Occasionally and on some kinds of work it has proved valuable, but in chemical engineering work it is often as absurd as a grand piano in a lumber camp. Those who have time enough and energy enough to write progress reports most frequently have little to put in them. And a regular progress report on the development of chemical engineering processes might consist of a series of dashes and exclamation points if the modest stenographer refused to type profanity.

The difficulty of chemical engineering development is vividly called to mind by the award of the Perkin medal to Hugh Kelsea Moore on Jan. 16, 1925. Progress reports of Moore's achievements in technology, substantial and significant as they are, would have made extremely discouraging reading. Oftentimes they would have been merely a dash, an exclamation point and a bucket of tears. All great chemical engineering developments come slowly. The change from week to week may be negligible. It may seem to be a retrogression. The work is hard and depressing. It requires courage, initiative and a balanced vision that steers toward an ultimate goal, though it is often necessary to tack backward and forward to get there. Perhaps the thing that stands out most prominently in the list of prerequisites for success is courage. Without it the best technology, the greatest enthusiasm, the most liberal financial support will be ineffective.

> "If you can see the things you gave your life to, broken
> And stoop and build 'em up with worn out tools."

Moore's technical triumphs presuppose an unusual technical competence, an aggressive initiative and many things more. But above all they point to a courageous spirit that can keep working in spite of setbacks, in spite of physical discomfort, in the face of desperate odds.

The Perkin medal award is an occasion in the chemical engineering world. Its recipient is invariably distinguished by outstanding technical achievements. Selected by a jury that represents every chemical society in the country, the Perkin medalist represents no clique, no vociferous minority, but the sober judgment of the representatives of the whole fraternity. Hugh Moore's technical achievements amply qualify him for the honor.

For almost 30 years he has been actively engaged in chemical engineering work. Years ago he developed the Allen-Moore cell for the electrolysis of salt. It was revolutionary, with its unsubmerged diaphragm. It permitted high current densities, high efficiency, low production of troublesome hypochlorites and chlorates. In the paper and pulp field Moore has made outstanding contributions. The evaporation of waste liquor from a sulphate mill and the recovery of the soda constituted an outstanding piece of work. It is known as the explosion process and consists of evaporating the solution to a point at which the heat of combustion of organic material heats the mass to incandescence and evaporates the remaining water. The thick, viscous liquor is pumped to a vessel and maintained under high pressure and high temperature until it is projected as a spray into a combustion chamber. Here it explodes. The water is evaporated and the organic matter burned off, giving a better product than by earlier methods. This process eliminated much manual labor, much expensive replacement of equipment and the danger to workmen in the plant. Chemical engineers will appreciate the difficulties involved in developing the process — difficulties that at times seemed insurmountable and required ingenuity, persistence and courage.

A complete list of Moore's achievements is long and reveals a versatility that is amazing. The hydrogenation of oils, new types of evaporators, a continuous process for making bleaching powder, carbon bisulphide, hydrochloric acid by the union of chlorine and hydrogen and many others are the results of his tireless energy. The chemical engineering world does well to give its applause and one of its most signal honors to such a man.

# Readers' Views and Comments

***An Open Forum***

The editors invite discussion of articles and editorials or other topics of interest

## Alum Accelerates Set of Gypsum

*To the Editor of Chem. & Met.:*

Sir—On page 41 of the Jan. 12, 1925, issue of *Chem. & Met.* under the title "Chemistry in the Building Trades" there is this statement: "Alum, well known as a styptic, was early used to insure the *delayed* setting and to produce a harder plaster."

I wish to call your attention to the fact that this statement is incorrect, as alum is most decidedly an accelerator—that is, hastens the set of plaster. I refer you to Report Iowa Geological Survey, Vol. XXVII, page 372. As a matter of fact, certain towns where the water is alum treated require a longer setting plaster than those localities where the water is untreated.

S. H. CAMP,
Chemist Universal Gypsum Co.

Akron, N. Y.

## Charcoal Iron Workers Journal

*To the Editor of Chem. & Met.:*

Sir—We noticed in your Jan. 5 issue Mr. Calderwood's letter about the *Journal* of the U. S. Association of Charcoal Iron Workers, in which he points out that this journal is rather rare and difficult to obtain. We have in our library at the du Pont Experimental Station, Henry Clay, Del., the first eight volumes of this journal, bound. Our library is willing to lend these volumes to any organized library under the usual conditions of an inter-library loan—that is, that the borrowing library pay the transportation both ways and assume responsibility for the books while in its possession.

RUTH E. MERLING.

E. I. du Pont de Nemours & Co.,
Experimental Station,
Henry Clay, Wilmington, Del.

## Refrigeration for Lard Rolls

*To the Editor of Chem. & Met.:*

Sir—Professor Macintire's article, "Producing Wax and Lard by Mechanical Refrigeration," in *Chem. & Met.*, vol. 31, p. 699, Nov. 3, 1924, contains an interesting calculation of the refrigeration required for lard chilling. In discussing the results with an engineer who has had extensive experience in handling lard and lard compound, he remarked that with a 40-ton refrigerating plant he had been able to chill an average of 8,000 lb. of compound per hour from 135 to 42 deg. F. on a 4x9-ft. lard roll, which is equivalent to 0.416 ton of refrigeration per ton of product. This checks rather well with tests that have been made in Chicago. In one of these, brine was metered in passing to the brine roll and it was found that 0.271 ton of refrigeration was required to cool 1 ton of compound from 95 to 40 deg. F. For a temperature range from 135 to 42 deg. about 0.35 ton would be necessary and adding 10 per cent for radiation losses brings the total quite close to the figure of 0.416 ton given above.

The discrepancy between these practical determinations and Professor Macintire's calculations would seem to indicate that the value for latent heat of fusion of lard and compound, 90 B.t.u. per lb., may well be questioned. Values of 12, 90 and even as high as 180 have been given by various investigators. In view of this lack of agreement and the enormous influence that this factor has on the calculated result, it would seem advisable to use a figure in harmony with practice. Using the data of the Chicago test referred to above, let us calculate the latent heat of fusion, $l$:

$$2{,}000 \times 0.5 \times (95 - 40) + 2{,}000\,l = 0.271 \times 288{,}000$$
$$55{,}000 + 2{,}000\,l = 78{,}048$$
$$2{,}000\,l = 23{,}048$$
$$l = 12 \text{ B.t.u. per lb.}$$
(approximately)

While this value is not of course scientifically exact owing to the simultaneous effect of other variables, it will give results that check quite satisfactorily with practice.

To the factors mentioned by Professor Macintire as influencing the amount of refrigeration should be added the time that brine is circulated through the roll before the product is run on. Some plants even go so far as to leave the refrigeration on during the noon hour, which would have a decided effect on the amount of refrigeration per ton of product.

A. G. WIKOFF.

New York City.

## Scientists and Postage Stamps

*To the Editor of Chem. & Met.:*

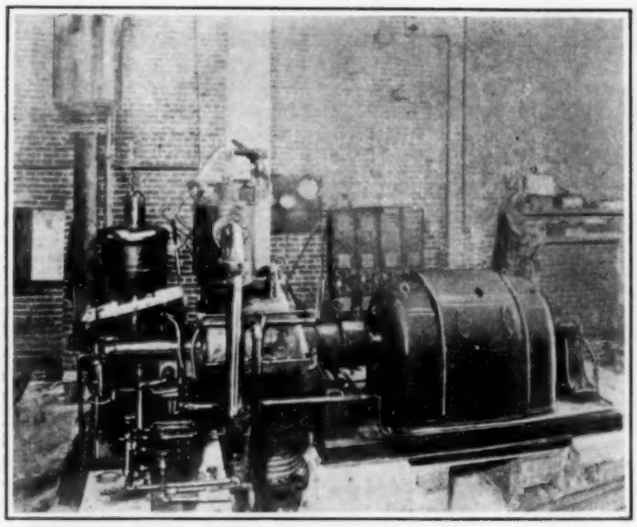
Sir—I have read with much interest the editorial on page 3 of your Jan. 5, 1925, issue, in which reference is made to the "novel" recognition accorded Pasteur by France in placing his picture on her postage stamps. Pasteur is by no means the first scientist to be thus honored; in looking over my collection of stamps, I find the following:

The first stamp issued by the United States Government, 1847, bore the likeness of Benjamin Franklin. Chile followed in 1853 with a portrait of Columbus, for more than half a century the only face to adorn her stamps. In 1855 Canada illustrated Jacques Cartier; in 1889 New South Wales Captain Cook, the great navigator. Among other men of science and art may be mentioned: Paderewski and Copernicus on the stamps of Poland; Mozart, Beethoven, Strauss and other musical men on those of Austria; Jon Sigurdsson on those of Iceland.

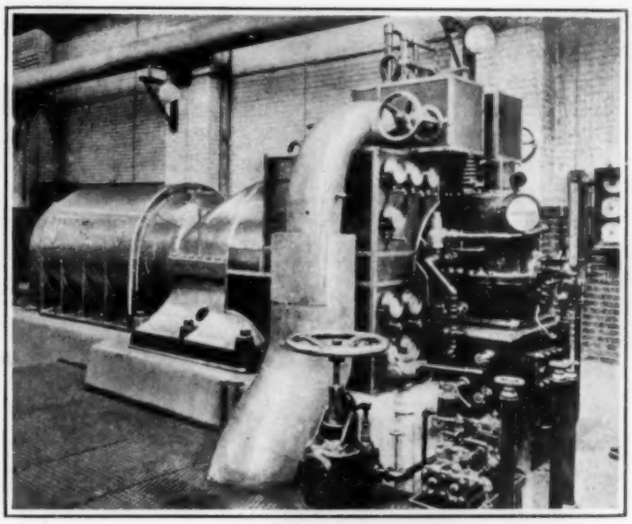
It would be glorious indeed if the nations of the earth in peaceful competition would show their great discoverers, artists and inventors, as models to follow. And also if they would make it possible for their living sons to bring their ideas to fruition. Not like the unfortunate Kress, who not so many years ago could not raise a few thousand kronen to build his "kite-flier" and now, after his death, has his picture put on the air-mail stamps of his homeland.

CORNEL KMENTT.

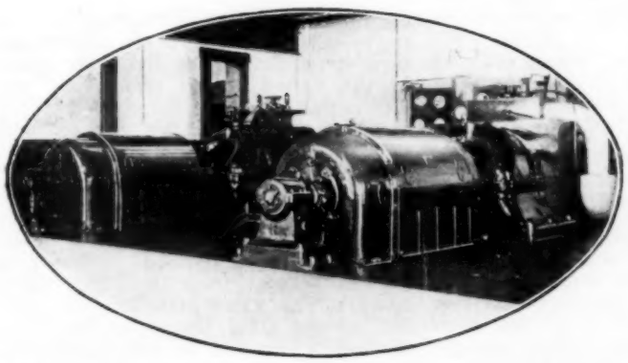
Youngstown, Ohio.



*Non-condensing turbine, atmospheric exhaust. Will supply steam at atmospheric pressure for process or heating. Requires no condensing water. Best applied with a steady process steam load.*



*Bleeder turbine with low- or high-pressure steam extraction. This type of turbine is adapted to plants having a variable process steam load at a pressure above atmosphere. Requires condensing water.*

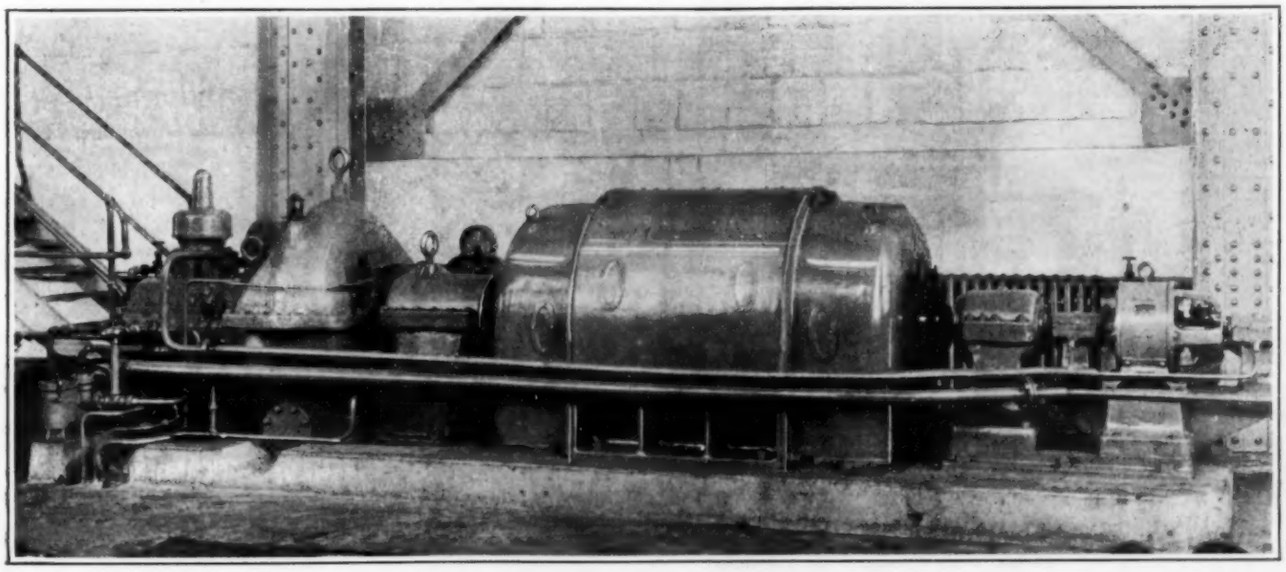


*Above—Mixed pressure turbine. This is used where low-pressure exhaust steam from the process is available to run the turbine. High-pressure steam is used to meet peak loads on the turbine. Condensing water is required.*

## Electric Power as a Byproduct

PLANTS where steam is used for heating or otherwise in the process of manufacture and that also have an electric load for power or lighting can obtain their current as a byproduct of steam generation by means of the installation of the proper type of steam turbine. There are several types of turbines, illustrated on this page, which can be used for this service, the choice depending on plant conditions. With the correct turbine and good engineering, and proper operation, power obtained in this manner should be at a cost lower than that at which any central station can supply it.

*Below — Non-condensing turbine, high-pressure exhaust. This is the type of turbine used in installations where a supply of high-pressure steam is needed in the process.*



# Equipment News

*From Maker and User*

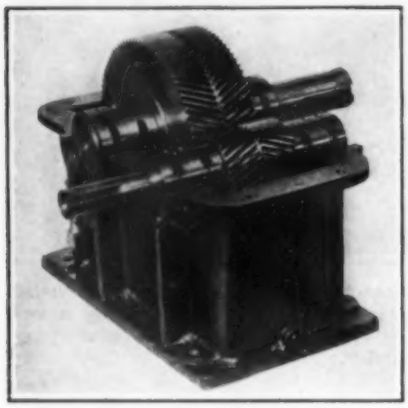


**Fig. 1—Type "H" Speed Reducer With Top of Casing Removed to Show Gears and Bearings**

## Speed Reducers

Two new models of speed reducers have recently been brought out by the Poole Engineering & Machine Co., Baltimore, Md. These are the type "H" and the type "K."

Type H, shown in Fig. 1, consists of a double helical gear of forged steel and a double helical pinion cut integral with the high-speed shaft, this latter being made of chrome-vanadium steel. These gears are ground and tested for static balance before assembly. A split casing, with the bearing bosses in the top and bottom halves, totally incloses these gears. Casing joints are ground to insure oil tightness. The removable bearings consist of cast-iron shells with babbitt metal linings. The bosses in the casing insure permanent alignment of these bearings.

For low-speed drives lubrication is obtained by a splash and gravity system by which the gear dips into oil held in the lower casing and carries this to a reservoir in the upper casing. From there it feeds by gravity to the bearings and directly between the gear teeth at the point of contact. For high-speed drives an oil pump and cooler are provided, feeding cool oil under pressure to all points.

In the type "K" speed reducer, shown in Fig. 2, a double helical cast-steel spur gear and a double helical forged-steel pinion integral with the high-speed shaft are used. Both gear and pinion have cut stub teeth. Shafts are mounted in babbitted bearings of the ring oiling type. The gears run in an oil-tight casing and are lubricated by the splash system. The high-speed shaft is located near the top of the casing and the driven shaft directly underneath. This puts the connection to the apparatus at a low point, thus giving a speed reducer that is adapted to those industries that use machines driven from a line shaft or by other means located near the floor.

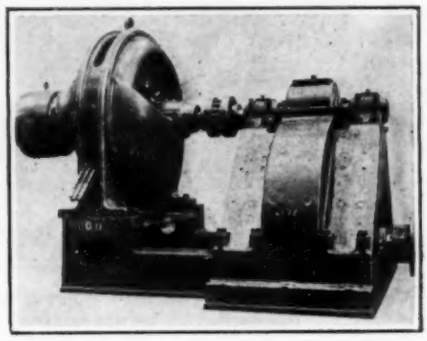


**Fig. 2—Type "K" Speed Reducer Direct Connected to Motor Through Flexible Coupling. Note the Low Position of the Driven Shaft**

## Rotary Compressor

For securing pressures of 6 or 8 atmospheres, reciprocating compressors have in the past been most often employed. However, a rotary compressor, the so-called Planche type, has been brought out in Europe that is said to perform this service satisfactorily.

In this compressor, an eccentric rotor within a cylinder is revolved to cause alternate increases and decreases of volume. This rotor is actuated with a uniform motion obtained by a combination of two uniform and stabilized rotary movements. The rotor has the shape of a spindle and at each of its extremities is provided with a movable radial steel paddle. These paddles, as the rotor revolves, press lightly against the cylinder walls due to the centrifugal force developed. They divide the space in the cylinder into two parts, the alternations in the volume of these divisions producing the suction and compression.

Because of this design, in which the delivery of compressed air is proportional to the rotation and the friction to only half the rotation, the friction losses are greatly reduced. In order to prevent leakage from the compression space, a flap valve made of two light but strong steel plates is provided. Cooling is obtained by water-jacketing the cylinder on all sides. All the moving parts are mounted on ball bearings, which reduces the power requirements. The machines are designed for direct connection to motor or gas engine, as desired. If desired, the machine can be used as a vacuum pump. Either as compressor or vacuum pump, it is claimed to give greater pressure or vacuum than can be obtained from a reciprocating machine.

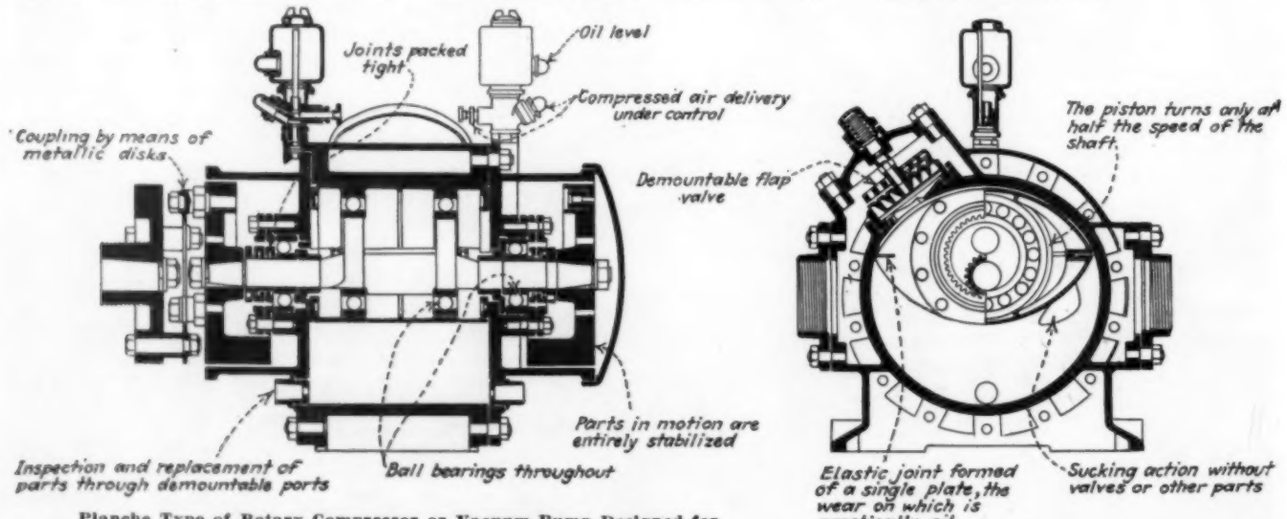

Joints packed tight
Oil level
Compressed air delivery under control
Coupling by means of metallic disks
Demountable flap valve
The piston turns only at half the speed of the shaft
Parts in motion are entirely stabilized
Inspection and replacement of parts through demountable ports
Ball bearings throughout
Elastic joint formed of a single plate, the wear on which is practically nil
Sucking action without valves or other parts

**Planche Type of Rotary Compressor or Vacuum Pump Designed for Giving High Pressures or Vacuums**

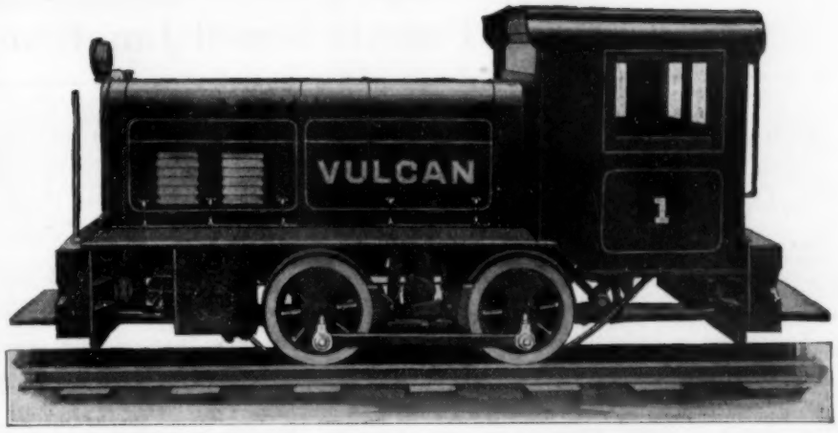
## Gasoline Locomotive

The Vulcan Iron Works, Wilkes-Barre, Pa., manufacturer of steam, gasoline and electric locomotives, has recently designed a high-powered gasoline locomotive of the 7-ton size, Class I.G.S. known as the "7-ton Special." This locomotive is of the worm gear drive type, which drive has been a feature of Vulcan gasoline locomotives for many years. The worm drive and reversing mechanism is mounted as a unit in a cast-steel, oil-tight, dustproof housing made in halves, placed in the center of rear axle, permitting of quick and easy assembling or disassembling without the necessity of removing the axle from under the locomotive.

The transmission is of the four-speed, selective gear type, gears being of the constant-mesh jaw type, wherein the gears are always in mesh, and speed changes are made through the engagement of jaw clutches and not through the clashing of gears, thereby eliminating all chance of gears stripping, and also making possible easier and quicker speed changes without loss of acceleration or momentum to the locomotive and load. The transmission case is entirely inclosed and protected from dirt and grit by packings and covers.

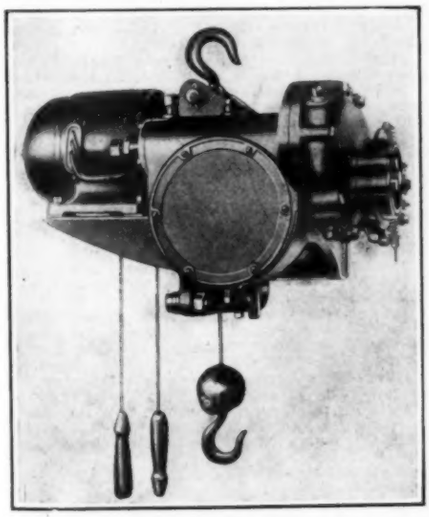
This locomotive has sufficient power to slip its wheels in first and second speeds, and the drawbar pull at these speeds depends on condition of track and rolling stock. The rated drawbar pull under normal conditions will be as follows in each speed: 2 m.p.h., 4,200 lb.; 4½ m.p.h., 3,500 lb.; 7¼ m.p.h., 2,500 lb.; 10½ m.p.h., 1,725 lb.

The specifications of this "7-ton Special" show the following equipment: Waukesha Model D. U. (bus) motor, developing 60 hp. at 1,400 r.p.m. with Splitdorf magneto and Westinghouse self-starter and electric lights (both ends); Stromberg carburetor; Willard storage battery. Radiator is of the tubular type, well protected.




**7-Ton Vulcan Worm Gear Drive Gasoline Locomotive, Class I. G. S.**

Note the cast steel bar type frames and forged steel side connecting rods as in steam locomotive practice.



**Small Electric Hoist**

This hoist is worm geared, with the worm above the wheel, eliminating much wear. The worm shaft has an end thrust ball bearing. Motors are standard, mounted on their own feet on an extension of the hoist frame. The main frame is a one-piece casting. An automatic stop is provided. The motor has a jaw brake acting in series with the controller, which is of the single-speed drum type. Alternatively, a push button control and electric magnetic brake may be had. The cut shows the hoist built for hook suspension. Various types of trolley suspension are also furnished as desired.

## Lamp Guards

The Flexible Steel Lacing Co., Chicago, Ill., has revised and simplified its line of expanded metal lamp guards. There is now a choice of key-locking or screw-locking guards in standard brass or weatherproof sizes. Both types are made in regular and reflector styles. There is now a locking or plain guard for mill type lamps in four socket sizes. Also a portable guard is made for both types of sockets in regular, reflector and mill types.

## Small Electric Hoist

A new small electric hoist, in 500-lb., 1,000-lb. and 2,000-lb. capacities, has recently been added to the line of the Roeper Crane & Hoist Works, Inc., Reading, Pa., which now makes a complete line of hoists, ranging from 500-lb. to 20,000-lb. capacity.

This hoist has been especially designed to fill the need for a small capacity, high-speed electric hoist to take the place of the hand-operated chain block. For such use it is well adapted, doing its work more quickly and at less cost than the chain block. It is designed so that it may be operated by anyone, being simple and rugged in construction.

## Electrode Holder

A new type of welding electrode holder marketed by the General Electric Co. allows welding operators to make a quick change from burnt stub to new electrodes. The operator needs only to strike the stub end of the old electrode, causing it to drop out, when the new wire can be inserted instantly without unnecessary effort.

The new holder consists of a punched fiber tube with a tinned brass plug inserted in the end. A steel spring rod holds the electrode in place against one of a number of different sized notches provided for the purpose. The welding cable running to the source of power is soldered to the other end of the holder by removing the fiber tube and fiber guard, accomplished by loosening a single screw.

The construction of this holder is such that the contact of the electrode is not weakened by heat, since it does not depend upon any heat-affected spring.

## Manufacturers' Latest Publications

Mesta Machine Co., Pittsburgh, Pa.—Bulletin B. A catalog of gear drives with double-helical cut teeth, particularly adapted to driving large rolls, presses and mills.

W. A. Jones Foundry & Machine Co., Chicago, Ill.—Catalog 32. A new catalog of chain an sprockets for power transmission and the accessories used with them.

Steere Engineering Co., Detroit, Mich.—Pamphlet 272. A leaflet describing welded steel gas purifiers.

Christian Becker, Inc., 92 Reade St., New York City—Catalog 7. A general catalog of this concern's full line of precision balances and weights for laboratories.

The Bossert Corporation, Utica, N. Y.—Catalog describing the "J. B." hammer mill and accessories, used for the crushing and grinding of many chemical plant raw materials.

Braun Corporation, Los Angeles, Calif.—Bulletin 424. A catalog describing the construction, operation and use of the Herman screening ball mill, made by this concern.

Leeds & Northrup Co., Philadelphia, Pa.—A leaflet on the standard mica condenser made by this company.

Eimer & Amend, 205 Third Ave., New York City—Bulletin 342. A pamphlet describing the Karns-Maag Grease Consistometer, an instrument for testing the consistency of soaps, greases and similar materials.

Baker-Perkins Corp., 25 West 43rd St., New York City—Catalog 1-7. A catalog of the Werner & Pfleiderer Co., a division of this concern, describing a new pneumatic hydraulic accumulator for use with hydraulic press installations.

The Duriron Co., Dayton, Ohio.—Bulletin 136. A pamphlet describing the Duriron Centrifugal Pump No. 112, a new design.

The Brown Instrument Co., Philadelphia, Pa.—Catalog 32. A catalog describing Brown instruments for measuring $CO_2$ electrically.

General Electric Co., Schenectady, N. Y.—Bulletin 43525. A catalog entitled "Pendant and Bracket Novalux," describing and illustrating different types of lighting and fixtures for outdoor lighting.

Conveyors Corporation of America, 326 West Madison St., Chicago, Ill.—A report on the installation and operation of a steam jet ash conveyor at the power plant of the Wabash R.R. at Fort Wayne, Ind.

# U. S. Patents Issued Jan. 6 and Jan. 13

**January 6, 1925**

Electroplating Apparatus. William E. Belke, Chicago, Ill.—1,521,592.

Dyeing Apparatus. John Brandwood and Joseph Brandwood, Elton, Bury, England.—1,521,594.

Still. Max F. De Bajligethy, Houston, Tex.—1,521,601.

Method of Extracting and Recovering Vanadium. Joseph L. Dixon, Wolverhampton, England, assignor to Barton R. Shover, Pittsburgh, Pa.—1,521,607.

Process for Manufacturing Basic Copper Carbonate. Eugene Fitzpatrick, New York, N. Y., assignor to Nichols Copper Co., New York City.—1,521,611.

Process of Degreasing Raw Wool. Oliver Reginald Herzog, Berlin-Dahlem, Germany. —1,521,624.

Method of Enameling Centrifugally Cast Pipe. James B. Ladd, Ardmore, Pa., assignor to United States Cast Iron Pipe & Foundry Co., Burlington, N. J.—1,521,634.

Process for Molding Rubber Articles and Articles Produced Thereby. Merwyn C. Teague, Elmhurst, N. Y., assignor to American Rubber Co., East Cambridge, Mass.—1,521,657.

Suction Box for Paper Machines, Pulp-Drying Machines and the Like. Johan Daniel Ullgren, Stocksund, Sweden, assignor to Aktiebolaget Karlstads Mekaniska Verkstad, Karlstad, Sweden.—1,521,659.

Process of Making Ammonia From Hydrogen and Nitrogen. Samuel Peacock, Wheeling, W. Va., assignor to Willis G. Waldo, Washington, D. C.—1,521,708.

Vulcanization of Rubber. Herbert Skellon, Middleton, England, assignor of two-thirds to Tom Hartley Roberts, Surrey, England, and Hubert Bryan Rankin Clarke, Radlett Herts, England.—1,521,720.

Art of Preparing Wood Separators for Storage Batteries. Petrarch Augustine Godfrey Steerup, Chicago, Ill., assignor to U. S. Light & Heat Corporation, Niagara Falls, N. Y.—1,521,726.

Alloy. John F. Wandersee, Highland Park, and John L. McCloud, Dearborn, Mich., assignors to Ford Motor Co., Detroit, Mich.—1,521,736.

Rubber Vulcanization. Morris L. Weiss, Belmar, N. J., assignor to Dovan Chemical Corporation, Wilmington, Del.—1,521,739.

Highly Refractory Article. Henry H. Buckman, Jacksonville, Fla., and George A. Pritchard, New York, N. Y., assignors to Buckman & Pritchard, Inc., Jacksonville, Fla.—1,521,749.

Conical Crushing Mill. Charles F. Smith and Harvey H. Rumpel, Milwaukee, Wis., assignors to Smith Engineering Works, Milwaukee, Wis.—1,521,795.

Anhydrous Grape Sugar. William B. Newkirk, Riverside, Ill., assignor, by mesne assignments, to International Patents Development Co.—1,521,829.

Manufacture of Dextrose. William B. Newkirk, Riverside, Ill., assignor to International Patents Development Co., Wilmington, Del.—1,521,830.

Acid-Fixing Bath. Samuel E. Sheppard, Rochester, N. Y., assignor to Eastman Kodak Co., Rochester, N. Y.—1,521,840.

Vulcanizing System. Adrian O. Abbott, Jr., Detroit, Mich., assignor to Morgan & Wright, Detroit, Mich.—1,521,851.

Nitrocellulose Composition. Frank J. Bohan, Rochester, N. Y., assignor to Eastman Kodak Co., Rochester, N. Y. —1,521,859.

Rennet Casein and Process of Making the Same. Andrew A. Dunham, Bainbridge, N. Y., assignor to Casein Manufacturing Co., New York City.—1,521,873.

Process of Treating Cellulose Acetate. Edward S. Farrow, Jr., Rochester, N. Y., assignor to Eastman Kodak Co., Rochester, N. Y.—1,521,876.

Inner Tube and Its Method of Manufacture. John E. Glickert, Indianapois, Ind., assignor to G. & J. Tire Co., Indianapolis, Ind.—1,521,879.

Photographic Film With Laminated Support Having Increased Flexibility. James H. Haste, Rochester, N. Y., assignor to Eastman Kodak Co., Rochester, N. Y. —1,521,881.

Apparatus for Heating or Cooling Material. Alex G. Huhn, Minneapolis, Minn., assignor to A. Huhn Manufacturing Co., Minneapolis, Minn.—1,521,885.

Drier for Various Forms of Material. Anton Huhn, Minneapolis, Minn., assignor to A. Huhn Manufacturing Co., Minneapolis, Minn.—1,521,886.:

Grinding Mill. Henry F. Kleinfeldt, Newark, N. J.—1,521,891.

Method and Apparatus for Treating Materials. Walter E. Trent, Washington, D. C., assignor, by mesne assignments, to Trent Process Corporation, Washington, D. C.—1,521,917.

Fuel Substance and Process of Producing the Same. Walter Edwin Trent, Washington, D. C., assignor to Trent Process Corporation, Washington, D. C.—1,521,918.

Process for Preserving Woods. Paul Tolmer, Paris, France.—1,521,977.

Production of Tetryl and Ethyl Tetryl. Thomas Joseph Nolan and Henry William Clapham, Stevenson, Scotland, assignors, by mesne assignments, to E. I. du Pont de Nemours & Co.—1,522,025.

Art of Extracting Radium and Other Values From Carnotite Ores and the Like. Karl B. Thews, Denver, Colo., assignor to William A. J. Bell, Denver, Colo. —1,522,040.

Insecticide, Vermifuge, Sheep Dip and the Like. Edward Bagnall-Bull, London, England.—1,522,041.

Basic Bismuth Salt of Guaiacol Carboxylic Acid. Hans Hahl and Walter Kropp, Elberfeld, Germany, assignors to Farbenfabriken vorm. Friedr. Bayer & Co., Leverkusen, near Cologne-on-the-Rhine, Germany.—1,522,054.

Azodyestuffs and Process of Making the Same. Hermann Wagner, Hochst-on-the-Main, and Otto Sohst, Hanau-on-the-Main, Germany, assignors to Farbwerke vorm. Meister Lucius & Bruning, Hochst-on-the-Main, Germany.—1,522,089.

*These patents have been selected from the latest available issue of the "Official Gazette" of the United States Patent Office because they appear to have pertinent interest for "Chem. & Met." readers.*

*Complete specifications of any United States patent may be obtained by remitting 10c. to the Commissioner of Patents, Washington, D. C.*

Process of and Apparatus for Decomposing Potassium-Bearing Minerals. Clive Morris Alexander, Waxahachie, Tex. —1,522,091.

Manufacture of Zinc Oxide. Frank G. Breyer, Earl C. Gaskill, and James A. Singmaster, Palmerton, Pa., assignors to New Jersey Zinc Co., New York City. —1,522,096, 1,522,097 and 1,522,098.

Process for Treating Glauconite or Greensand. Robert O. Friend, Chicago, Ill. —1,522,112 and 1,522,113.

Method of Conditioning Electrodes. Ross Buxton Rathbun, Salt Lake City, Utah, assignor to American Smelting & Refining Co., New York City.—1,522,143.

Mold for Making Glass Spark-Plug Bushings. Maurice A. Smith and Joseph Blaze, Jeannette, Pa., assignors to McKee Glass Co., Jeannette, Pa.—1,522,150.

Composition of Matter for Treating Photographic Paper. Charles N. Waterhouse, Oklahoma City, Okla.—1,522,161.

Kiln and Method of Operating Same. Louis Wilputte, New Rochelle, N. Y., assignor to American Dressler Tunnel Kilns, Inc., Cleveland, Ohio.—1,522,166.

Vat Dyestuffs. Arthur Luttringhaus, Mannheim, and Paul Nawlasky, Ludwigshafen-on-the-Rhine, Germany, assignors to Badische Anilin- & Soda-Fabrik, Ludwigshafen-on-the-Rhine, Germany.—1,522,251.

Production of Formic Acid. Kurt Heinrich Meyer, Mannheim, and Johannes Muller, Eppstein, near Frankenthal, Germany, assignors to Badische Anilin- & Sodafabrik, Ludwigshafen-on-the-Rhine, Germany. —1,522,257.

Low-Temperature Emulsification of Cheese. Clinton H. Parsons and William D. Richardson, Chicago, Ill., assignors to Swift & Co., Chicago, Ill.—1,522,383.

Emulsification and Pasteurization of Cheese. Clinton H. Parsons and William D. Richardson, Chicago, Ill., assignors to Swift & Co., Chicago, Ill.—1,522,384.

Process of Making Pasteurized Loaf Cheese. Clinton H. Parsons and William D. Richardson, Chicago, Ill., assignors to Swift & Co., Chicago, Ill.—1,522,385.

Apparatus for Pasteurizing Cheese. Clinton H. Parsons and William D. Richardson, Chicago, Ill., assignors to Swift & Co., Chicago, Ill.—1,522,386.

Apparatus for the Destructive Distillation of Coal and the Like. Elmer J. Crossen, Joliet, Ill.—1,522,421.

Process of Treating Oils. Carbon P. Dubbs, Wilmette, Ill., assignor to Universal Oil Products Co., Chicago, Ill.—1,522,425.

Food Product. Llewellyn R. Ferguson, Le Roy, N. Y., assignor, by mesne assignments, to the Jell-O Co., Inc., Le Roy, N. Y. —1,522,428.

**January 13, 1925**

Method of Solvent Recovery. Robert C. Allen, Lakewood, O., assignor to Henry L. Doherty & Co., New York City.—1,522,480.

Unshrinkable Wool and Woolen Material. Samuel Russell Trotman, Nottingham, England.—1,522,555.

Bleaching Solution Containing Bromine Compounds. Harry M. Weber, Montclair, N. J., assignor to John D. Cardinell, Montclair, N. J.—1,522,560.

Bleaching Solution. Harry M. Weber, Montclair, N. J., assignor to John D. Cardinell, Montclair, N. J.—1,522,561.

Apparatus for Handling and Drying Bricks or Other Plastic Products. David J. Strickland, Cleveland, O., assignor to American Equipment Co., Chicago, Ill. —1,522,600.

Method for Producing a Disinfecting or Cleansing Spray for Hygienic and Medical Purposes. Johannes Freng and Einar Bergve, Christiania, Norway.—1,522,610.

Adhesive and Process of Making Same. Lawrence Bradshaw, New York; N. Y., assignor to Henry V. Dunham, Mount Vernon, N. Y.—1,522,611.

Corncob Product and Method of Making the Same. Norman E. Ditman, New York, N. Y.—1,522,618.

Process of Making High-Grade Glass. Charles E. Parsons, New York, N. Y., assignor to Metal Research Corp., New York City.—1,522,697.

Process of Making Sodium Aluminate and Other Products. Charles E. Parsons, New York, N. Y., assignor, by mesne assignments, to Metal Research Corp., New York City.—1,522,698.

Process for Vulcanizing Rubber and Product Obtained Thereby. Sidney M. Cadwell, New York, N. Y., and Claude D. Mason, Bloomfield, N. J., assignors to Naugatuck Chemical Co.—1,522,712.

Apparatus for Melting Scrap Metal. Erwin L. Wilke, Hammond, Ind., assignor to Metals Refining Co., Hammond, Ind. —1,522,765.

Method of Making Rubber Articles and the Like. Fred S. Van Valkenburg, Waterbury, Conn., assignor to Waterbury Farrel Foundry & Machine Co., Waterbury, Conn. —1,522,795.

Grinding or Crushing Mill. Walter James Coles, Sheffield, England, assignor of one-half to Edgar Allen & Co., Ltd., Sheffield, England.—1,522,808.

Alloy. Harry Etchells, Bradway, near Sheffield, England.—1,522,813.

Manufacture of Transparent Soap. Jicknam Tseng, London, England.—1,522,846.

Method for Testing Gas Mixtures. Clyde Lennard Voress, Vernon Charles Canter, and Robert Walfred Skoog, Charleston, W. Va., assignors to Gasoline Recovery Corp. —1,522,848.

Solvent for Cellulose Acetate. Gerald P. Young, Dayton, O.—1,522,852.

Making Emulsions. Judson A. DeCew, Mount Vernon, N. Y., assignor to Process Engineers, Inc., New York, N. Y. —1,522,871.

Metal Vessel for Storing and Conveying Liquefied Gases. Paul Heylandt, Berlin-Sudende, Germany.—1,522,886.

Baffle for Centrifugal Oil Separators. Robert Jenett Pabodie, Maywood, Ill., assignor to Griscom Russell Co., New York City.—1,522,903.

Evaporator Feed and Overflow Regulator. Joseph Price, New York, N. Y.—1,522,907.

Method of Curing Rubber. Waldemar O. Hamister and Victor C. Hamister, Cleveland, O., assignors of one-half to Goodyear Tire & Rubber Co., Akron, O., and one-half to National Carbon Co., New York City. —1,522,954.

Automatic Means for Controlling the Flow of Liquid Into a Tank. Gustav Strandt, Milwaukee, Wis., assignor to Milwaukee Dairy Supply Mfg. Co., Milwaukee, Wis.—1,522,982.

Apparatus for Extracting Petroleum From Shale and Other Minerals. George A. Taff, Colorado Springs, Colo.—1,522,985.

Gold Alloy. Otto Liebknecht, Frankfurt, Germany, assignor to Roessler & Hasslacher Chemical Co., New York City. —1,523,026.

Electrode Element for Galvanic Batteries and Method of Producing Same. Martin L. Martus, Woodbury, Conn.—1,523,029.

Apparatus for Refining Hydrocarbon Oils. Ulysses F. Clemons, Marshall, Okla. —1,523,053.

# News of the Industry

## Summary of the Week

Senate subcommittee amends Cramton bill to meet some of the compromise views expressed during the hearings.

Producers and dealers in naval stores will meet today to discuss workings of the naval stores act.

Reports from Germany state that an increase in potash prices may be expected in the near future.

Official figures for November indicate a material decline in exports of chemicals and related products.

Standard invoice, purchase order and inquiry forms for industry adopted at conference in Washington.

Secretary Hoover points out how government expenditure of $100,000 eliminated $600,000,000 waste in industry.

John Fritz gold medal awarded to John F. Stevens of New York City.

House of Representatives passes bill for systematic production of helium.

### Some Government Spending a Public Service, Says Hoover

Commerce Secretary Hoover after listening to an appeal for less government spending, voiced by General Lord, the director of the budget, at the annual dinner of American Engineering Council, put forward the idea that some of the Federal Government's spending is in the public interest. He pointed out that the reproductive services of the government are adding to the national wealth and make available for taxation hundreds of millions of dollars. He cited as an example his estimate that the expenditure by the Department of Commerce of $100,000 in efforts to eliminate waste in industry had resulted in the saving of $600,000,000.

Content with putting this thought before General Lord and American Engineering Council, Secretary Hoover brought out forcefully the great good which General Lord is accomplishing and suggested there should be forty-nine of him, so that each state, in addition, could have a General Lord to supervise its budget.

In expressing the hope that American Engineering Council may carry on and gain in strength, Secretary Hoover expressed the wish that the reorganization of the Council "will make it possible for some of our engineering brethren to come more amiably into line." "It may be," he continued, "we shall have to wait for the death of some of the older members of some of the societies, but we can live in hope, and in the meantime we must keep the Council alive. If the institution can produce, not once in 5 years but once in 50 years, the beginning of a great national conception in the change of our economic system, such as was produced 5 years ago (the Elimination of Waste Report), it will warrant its existence and all of the labor which you gentlemen have devoted to it."

### *Increase Expected in Prices for German Potash*

Information reaching Washington from Germany is to the effect that an increase in potash prices may be expected in the near future. Because of the Alsatian agreement this seems to be the only way the German interests can secure any material advantage from the prospective increase in exports to the United States. In addition to the loss of 32½ per cent of this market to Alsace, the United States is now producing 10 per cent of its own potash needs, the Germans estimate. If the German properties again are to profit from American business at the pre-war rate, greatly increased prices would have to be secured.

### Plans for Third Colloid Symposium at University of Minnesota

The Third National Colloid Symposium will be held at the University of Minnesota on June 17, 18 and 19. The previous meetings have been remarkably successful, having brought together two or three hundred chemists from all over the United States and Canada. This occasion promises to surpass the previous meetings. Dr. Herbert Freundlich, author of the classic "Kapillarchemie," will be the guest of honor.

Only twenty papers will be presented, consequently each author is given 40 minutes instead of the unsatisfactory 10 minutes allotted at the huge meetings of the American Chemical Society.

Contributions for the program are solicited. All titles should be sent to Harry N. Holmes, chairman of the committee on the chemistry of colloids, Oberlin, Ohio.

### House Passes Bill for Systematic Production of Helium

Legislation launching the government's helium program in a comprehensive and systematic way was passed by the House of Representatives Jan. 21. When objection was raised to the bill on the ground that it was putting the government into the helium business and that even now private enterprise could produce helium at one-half of government costs, the bill was amended so as to make it mandatory to purchase helium from private producers if it can be bought from them at a lower cost than the government can produce it. Representative McKeown of Oklahoma, the author of the amendment to require the government to buy helium where it can be bought cheapest, declared that the government agencies have discouraged private production. He was given assurances during the debate that the government would withdraw from production as soon as private enterprise can meet its requirements.

The bill authorizes the Secretary of the Interior to acquire or lease lands for the purpose of conserving helium-bearing gas. It authorizes the prospecting of such lands, and the construction of plants, pipe lands and facilities for production, storage and repurification. The Bureau of Mines is charged with the principal responsibilities under the act. Exports of helium may be made only upon the joint recommendation of the Secretaries of War, Navy and Interior.

The bill was still further amended authorizing the army and navy each to designate an officer to co-operate with the Department of the Interior in carrying out purposes of the act. These representatives are to have complete right of access to all plants and data concerning the program for the production of helium.

## News in Brief

**Glass Melted in Electric Crucible Furnace**—Glass was melted by an electric crucible furnace in the plant of the Feldspar Glass Co., Oshawa, Ont., when that plant recommenced operations a few days ago after several years of idleness. The furnace at present in operation is constructed in such a manner that one section of it melts the glass and runs it through a trough to another section, where it is kept molten and in workable condition.

**Appropriation to Develop Oil Shale**—The Senate has approved an amendment to the Interior Department appropriation bill allotting $90,000 "for the development of oil shale, including the construction of the necessary plant and the purchase, lease or condemnation of the land necessary for the plant; for the purchase or mining of shale, the operation of the plant, and for all necessary incidental expenses." The probabilities seem to be that the House will accept this amendment.

**Chemical Products From Salt Water**—An experimental plant of temporary character has been installed at Ocean City, Md., by E. I. du Pont de Nemours & Co., Wilmington, Del., to determine the value of chemical byproducts to be secured from salt water, and the commercial, marketable character of such extraction. The equipment has been installed under the direction of R. W. Anderson, engineering department of the company.

**New Sugar Refinery at Newark**—The Newark Sugar Refining Co., recently organized with a capital of $5,000,000 by Adolph Segal, Pennsylvania Building, Philadelphia, Pa., and associates, has closed negotiations with the city of Newark, N. J., for the purchase of a tract of about 7 acres of land at Port Newark for a consideration of $150,000 and the lease of adjoining waterfront property. The site will be used for the construction of a new sugar mill, for which plans have been in abeyance for several months past. Work on initial units will proceed soon, with intention of having the buildings ready for service in the early fall. The plant will be equipped for an output of 5,000 bbl. per day, and is estimated to cost close to $5,000,000; the ultimate mill will have approximately twice this capacity, and will cost about $10,000,000. Most of the machinery will be electrically operated.

**Ethylene Gas Used in Blanching Celery**—By the use of ethylene gas plant physiologists of the University of Minnesota have demonstrated that celery can be blanched in from 6 to 10 days in place of several weeks required when stored in darkness or where the hilling up process is used.

**Canada's Paper Manufacture Increasing**—According to the Canadian Pulp and Paper Association, the value of pulp and paper manufactured in Canada during the 11 months ended November, 1924, was $129,124,165, an increase of $2,659,000 compared with the corresponding period in 1923.

## T.A.P.P.I. to Hold Annual Meeting in New York Next Week

The annual meeting of the Technical Association of the Pulp and Paper Industry will be held in the Waldorf-Astoria Hotel, New York City, Feb. 3 to 5. At the section meetings papers will be presented on the special problems of each group and at the general sessions the newest developments in the industry will be presented.

John E. Alexander and engineers associated with him will describe the design and operation of his paper drying machine using direct electrical heat. A. J. T. Taylor will describe the Ruths vapor accumulator and record his observations of a large number of installations during his visit of several months in Sweden, investigating its use in pulp and paper mills. In W. W. Greenwood's paper will be given the first presentation of an artificial pulpstone of novel construction that after several years experimentation has been developed by the Norton Co.

The annual dinner will be held at Hotel Commodore on Tuesday evening, Feb. 3.

## Analysis Made of Potash Beds in Texas

The discovery of potash in a well on the Cowden ranch, in Crane Co., Texas, about 50 miles southwest of Midland, has been widely reported, but no statement about it has yet been made from official sources. The Department of the Interior now announces that, through the courtesy of S. F. Johnson, who had charge of the drilling, samples of cuttings from this well have been analyzed by the Geological Survey. Cuttings of the beds penetrated and samples of the water used in drilling were taken from the bailer at intervals of 5 ft. through the greater part of the well.

The samples of cuttings analyzed were obtained from depths between 560 and 1,765 ft. The best sample, which contained 7.40 per cent of potash ($K_2O$), was taken from a depth between 1,065 and 1,070 ft. The interval between 1,070 and 1,075 ft. yielded a sample containing 7.20 per cent of potash. Another sample, nearly as good, containing 7.16 per cent of potash, was obtained from a depth between 945 and 950 ft. Samples taken at 890-895 ft. and at 895-900 ft. contained 6.24 and 5.10 per cent of potash, respectively. In addition samples taken at the depths given contained potash in the quantities stated: 905-910 ft. 4.28 per cent; 1,050-1,055 ft., 2.75 per cent; 950-955 ft., 2.50 per cent; 700-705 ft., 1.62 per cent. No other sample contained as much as 1.50 per cent of potash.

Analyses were made of samples of drilling water, most of them taken at intervals of 5 ft. from depths between 618 and 1,685 ft. Each sample of drilling water had been in contact with the salts long enough to become saturated. The quantity of dissolved salts in the samples ranged from 32 to 34.5 grams per 100 c.c. This variation in quantity, which is evidently due to variations in the temperature and the composition of the salts, is so small that when samples are compared the percentages of potash in the dissolved salts are practically in direct proportion to the weights of $K_2O$ per 100 c.c. of water.

The analyses of both the cuttings and the drilling water show that layers or masses containing potash occur at several levels, though some material dislodged from upper strata may have been recovered in the bailer from greater depths, thus creating a false impression of the presence of potash in the deeper layers. Samples of this sort afford little ground for reliable estimates of the thickness of the potash-bearing beds and still less ground for estimates of the volume of salts or the commercial value of any specific tract of land.

In brief, the Cowden well shows the existence in this intermediate area of potash-bearing beds similar to those of the Santa Rita well, in Reagan County, on the east, and to those of the River well and the Means well, in Ward and Loving counties, respectively, on the west. It has thus increased our knowledge of the extent and character of the potash field. In this well, however, the potash-bearing beds are 200 ft. or more nearer the surface than in the other wells of the region thus far studied.

## *Naval Stores Interests Will Hold Conference*

After having had 6 months of experience with the new naval stores act, producers and dealers are to be called upon, at a conference in Washington, Jan. 26, to offer criticisms and suggestions in the hope that any unsatisfactory features of the situation may be remedied. The results of a recent survey made by the Bureau of Chemistry to determine conditions existing in the trade with reference to the grading and labeling of rosin, will be discussed at the conference.

## New York Modifies Regulation on Sale of Tetra-ethyl Lead

The New York State Public Health Control on Jan. 20 modified the previous regulation prohibiting the distribution of tetra-ethyl lead. Its sale in concentrated form to the public is still prohibited, but distribution to refineries, bulk stations or filling stations and for research purposes is permitted. The full text of the new regulation, which will take effect March 1, is as follows:

The sale or distribution of tetra-ethyl lead in concentrated form, except to refineries, bulk stations or filling stations, is hereby prohibited. Such sale or distribution shall be made in safe, sealed containers.

Nothing herein contained shall be construed to prevent the sale or distribution of tetra-ethyl lead in concentrated form for experimental and research purposes or for use under special circumstances to persons whose applications therefor have been approved by the Commissioner of Health of the State of New York.

# Washington News

## Senate Subcommittee Amends Cramton Bill

Amended so as to provide for a Division of Permits as well as a Division of Alcohol and Chemistry, and also altered in several of its administrative sections, the Cramton bill to elevate the Prohibition Unit to the rank of an independent bureau of the Treasury Department, thus removing it from the jurisdiction of the Bureau of Internal Revenue, has received a favorable report from a subcommittee of the Senate Judiciary Committee headed by Senator Sterling. It will be submitted to the full Judiciary Committee Jan. 26 and this committee is expected to order a favorable report to the Senate, recommending passage.

The subcommittee is understood to have written into the bill provision for a Board of Review of three members, to be appointed by the Secretary of the Treasury from within the Treasury Department but no member of which shall be attached to the Prohibition Bureau. This meets the compromise view of the Anti-Saloon League. In suggesting the board, business interests generally had asked that the personnel of the board be one member from the Treasury Department outside the Prohibition Bureau, one to be appointed by the Secretary of Commerce and the third to be appointed by the Attorney-General.

In order to meet objections and suggestions from the retail druggists, with whom some other interests joined, the subcommittee provided for a Division of Permits, to handle applications regarding medicinal alcohol and permissible liquor. It is expected this division will be able to expedite action on permits.

The provision for a Division of Alcohol and Chemistry, to handle industrial alcohol, is practically the same as in the House bill. The chief of this division is to be a chemist, familiar with the industrial uses of alcohol, and is to be appointed by the Commissioner of Prohibition, with the approval of the Secretary of the Treasury. The chief of the Division of Permits is to be appointed in the same manner.

## Standard Forms for American Industry Recommended

Standard invoice, purchase order and inquiry forms for recommended use by all branches of American industry and commerce were adopted by a national conference held under the auspices of the Division of Simplified Practice, Department of Commerce, at Washington, D. C., Jan. 14.

R. M. Hudson, chief of the Division of Simplified Practice, presided. Secretary Herbert Hoover, in a brief but forceful address, stressed the importance of simplification in office forms, and complimented the conference on its efforts to eliminate waste in office procedure by attacking specific rather than general problems.

After considerable discussion the conference voted unanimously to adopt the standard invoice form for recommended trial by American industry and commerce. The standard purchase order and inquiry forms adopted some time ago by the National Association of Purchasing Agents were likewise considered and adopted by the conference. A standing committee was appointed to consider any objections to these forms that may arise and to arrange for later conferences to review them in the light of their further and wider use.

The Division of Simplified Practice will canvass all organizations and groups interested in these standard forms to secure their approval and adoption. When a sufficient number of ratifications are secured, the forms will be published as American standards in the Elimination of Waste Series of the Department of Commerce.

## Larger Output of Methanol and Acetate of Lime in November

According to reports of the operation of wood chemicals as submitted to the Department of Commerce, there was a gain in November in the output of methanol and acetate of lime. Revised figures also are given for production, shipments and stocks in preceding months. It is also pointed out that statistics for the past 4 months are not wholly comparable with those for the earlier months of the year because of a decrease in the number and capacity of firms reporting to the Department of Commerce. Latest statistics for 1924 are:

METHANOL

| | Production, Gal. | Shipments, Gal. | Stocks, End of Month, Gal. |
|---|---|---|---|
| Jan. | 705,747 | 642,812 | 2,632,633 |
| Feb. | 690,403 | 681,057 | 2,738,308 |
| March | 741,505 | 617,949 | 2,749,818 |
| April | 698,126 | 626,837 | 2,656,211 |
| May | 623,107 | 659,564 | 2,615,144 |
| June | 492,902 | 472,285 | 2,368,760 |
| July | 408,132 | 448,022 | 1,873,932 |
| Aug. | 444,612 | 525,756 | 1,797,729 |
| Sept. | 464,702 | 578,381 | 1,656,499 |
| Oct. | 539,333 | 621,412 | 1,551,678 |
| Nov. | 560,904 | 627,586 | 1,362,862 |

ACETATE OF LIME

| | Production, Lb. | Shipments, Lb. | Stocks, End of Month, Lb. |
|---|---|---|---|
| Jan. | 13,420,193 | 9,022,250 | 23,401,511 |
| Feb. | 13,172,610 | 8,548,032 | 27,622,967 |
| March | 14,107,411 | 9,027,539 | 32,370,329 |
| April | 12,650,393 | 12,460,054 | 30,534,533 |
| May | 11,538,625 | 8,561,412 | 33,985,853 |
| June | 9,396,138 | 9,261,158 | 32,291,427 |
| July | 7,713,750 | 7,056,113 | 23,756,732 |
| Aug. | 8,112,277 | 11,100,905 | 19,764,496 |
| Sept. | 8,449,457 | 10,024,528 | 18,069,783 |
| Oct. | 9,803,414 | 12,046,811 | 15,259,078 |
| Nov. | 10,305,653 | 11,412,367 | 11,854,988 |

## Metric Association Announces Gain in Use of System

The newer fields of engineering, of which radio is an example, are using the metric system of weights and measures. Students save 20 per cent of the time consumed in their calculations by employing the metric system. The metric system has been in use for 40 years at the Blue Hill observatory at Harvard University. Metric measures are used largely in the study of dietetics and nutrition. More hospitals have gone on the metric basis. The use of the metric system in prescribing is increasing.

The foregoing constitute the principal contentions and facts brought out at the recent annual meeting of the Metric Association in Washington. The principal speakers were: Hugh Miller, dean of engineering, George Washington University; Fletcher Durell, efficiency specialist; Alexander McAdie, Harvard University; Mildred Harrigan, Metric Association; Arthur E. Kennelly, Cambridge University; George K. Burgess, director, Bureau of Standards; Theodore H. Miller, DeLaval Separator Co., and Hazel E. Munsell, Bureau of Economics. Papers from Elwood Haynes of Kokomo, Ind., and Aubrey Drury of San Francisco were read.

Officers to serve during 1925 were chosen as follows: George F. Kunz, president; Arthur E. Kennelly, first vice-president; Theodore H. Miller, second vice-president; William Jay Schieffelin, third vice-president; Howard Richards, secretary, and Frederick L. Roberts, treasurer.

## New Chapter of American Institute of Chemists in Washington

The American Institute of Chemists announces that a new chapter has been constituted, which will be known as the Washington, D. C., Chapter. The officers are: J. F. Couch, president; H. E. Patten, vice-president; J. N. Taylor, secretary; H. L. Lourie, treasurer. Dr. Charles E. Munroe, as an honorary Fellow of the American Institute of Chemists, becomes a member of this chapter.

## Muscle Shoals Legislation Now Going to Conference

When the Muscle Shoals legislation came again before the House of Representatives, after the Senate had passed an amended Underwood bill, there was hesitancy about referring the matter to a conference between the two houses. An unusual situation was created by the fact that the bill passed by the House had been obliterated when Mr. Ford withdrew his offer. As a result the only legislation which would be before the conference committee would be the Senate substitute for the Ford bill. In this situation the conferees would enjoy unusual latitude. They would be in a position where they practically could rewrite the legislation to suit themselves. For that reason the House, which unquestionably favors the Underwood bill, objected to sending the bill to a conference, the Senate members of which were known to be hostile to the Underwood proposal.

As this is written an agreement practically has been perfected under which the Senate will depart from its custom and elect conferees other than the ranking members of the committee having jurisdiction. Assurances have been given that the Senate will not select its members of the conference committee from the ranks of those who fought the Underwood bill.

Prospects now seem to favor the passage at this session of some modification of the Underwood bill.

## First White Face Brick Plant in South Uses Georgia Kaolin

Within recent years the attention of manufacturers of refractories, brick, whiteware and other ceramic products has been directed to the immense deposits of high-grade kaolin in Georgia. The first company to undertake the exploitation of these deposits on a large commercial scale is the Georgia White Brick Co., recently organized to manufacture light-colored face brick. The plant now under construction at Gordon, Ga., will have an initial production of 50,000 bricks per day, although the machinery, except the kiln, will be capable of handling up to 200,000 bricks as demand warrants increase of production.

Dr. W. F. Demuth, president of the new company, is also president of the Canton Brick & Fireproofing Co., in which connection he became aware of the demand for light face brick in the South. When the possibilities of local manufacture from Georgia kaolin were suggested to him by the industrial department of the Central of Georgia Railway, an investigation was begun in which he had the assistance of R. T. Stull, assistant industrial agent, known throughout the ceramic industry for his work as chief ceramist, Bureau of Mines, and professor of ceramic engineering at the University of Illinois. Mr. Stull has been made secretary of the new company.

All equipment in the new plant will have individual motor drive, current being supplied by oil-engine-driven generators. The car-type tunnel kiln will also burn oil. All will be housed in a single building, 750x100 ft., of reinforced concrete construction.

In addition to the Southern demand, which amounts to about 50,000,000 bricks per year, this plant will also be in a position to export to Cuba, Central America and South America.

## The Colorado School of Mines Presidency Again Vacant

The board of trustees of the Colorado School of Mines, at its regular monthly meeting on Thursday, Jan. 8, adopted a resolution declaring the presidency of the school vacant from and after Sept. 1, 1925, the date on which the term of Dr. Victor C. Alderson, the present president, expires. No action looking to a successor to Dr. Alderson has as yet been taken by the board.

## Periodic Reports Proposed for Calcium Arsenate Stocks

As a result of the unprecedentedly small boll weevil infestation during the development of the 1924 cotton crop, a large cotton crop was produced and sold at a high price. The only fly in the ointment is the fact that comparatively small amounts of calcium arsenate were needed, with the result that all of the ground gained in the preceding year by the calcium arsenate industry has been lost.

While general information is not available as yet as to hibernation, counts in several districts have developed that the number of weevils found in moss or other protective coverings is fully up to the average. The deduction is that as heavy an infestation as has taken place in any other year may be expected during the next crop if conditions for the multiplication of the weevil should be favorable, as they are in the average year. In view of this dangerous possibility, cotton growers are much interested in having an industry behind them capable of supplying the maximum amount of calcium arsenate that they may be called upon to use.

In view of that fact it is believed that they will support a proposal that all manufacturers of calcium arsenate report production to some government agency so that the industry may govern its production intelligently. The growers also would benefit, along with the manufacturers, it is pointed out, since there would be periodic official reports showing the rate of production and possibly available stocks.

## Seventeenth List of Standards of Strength for Dyes

The Treasury Department has issued supplemental list No. 17 of the list of standards of strength of coal-tar dyes. The so-called standards are used in assessing the specific duty of 7c. per pound, which is applied in the ratio that the strength of the importation bears to the strength of similar importations prior to July 1, 1914. This latest supplemental list adds eight dyes to the standards, names fifteen others for similitude to dyes previously listed and makes six alterations in previous lists.

## Safety Conference Held in Baltimore

The Baltimore Safety Conference was held on Friday, Jan. 23, at the Emerson Hotel, Baltimore, Md. The meeting was under the auspices of the American Council of Safety Engineers, the Engineering Section of the National Safety Council and the Baltimore Safety Council. Special attention was given methods of practical accident prevention; aspects of plant design affecting safety, such as illumination, layout and electric appliances; and industrial safety from the standpoint of the surgeon, foreman and workman. In the issue of Feb. 2, *Chem. & Met.* will report the conference in full.

## Synopsis of Income Tax Returns of Chemical Companies

Of the 267 concerns engaged in the manufacture of chemicals making income tax returns in 1922, 149 paid cash dividends during the year of $13,957,274; seventy-eight reported book profits of $2,986,823, but did not pay cash dividends. The 267 concerns, however, had surplus and undivided profits at the close of 1922 of $63,461,594. The total net taxable income of the 267 companies was $27,019,764.

In addition 289 concerns engaged in the manufacture of paints and varnish made returns showing total net taxable income in 1922 of $20,782,512; 237 of those companies paid cash dividends during the year amounting to $4,739,269 and had surplus and undivided profits at the close of the year of $36,190,348.

The number of concerns manufacturing vegetable and animal oils that made tax returns was 119, with a total net taxable income of $10,166,353. Of that number 113 paid cash dividends aggregating $2,262,753 and had surplus and undivided profits at the close of the year of $22,968,370.

In addition 848 companies engaged in the manufacture of fertilizers, soaps and other chemicals and allied substances had net taxable incomes of $135,706,628. Of that number 606 concerns paid cash dividends of $64,227,169 and had surplus and undivided profits at the close of the year aggregating $212,835,825.

## John Fritz Medal Awarded to John F. Stevens

Award of the John Fritz gold medal to John F. Stevens of New York City "for great achievements as a civil engineer, particularly in planning and organizing for the construction of the Panama Canal; as a builder of railroads, and as administrator of the Chinese Eastern Railway," is announced by the Engineering Foundation.

This medal was established in 1902 in honor of John Fritz, pioneer in the American iron and steel industry. It is bestowed annually for notable scientific or industrial achievement. The award was made by a board of sixteen representatives of the American Societies of Civil, Mining and Metallurgical, Mechanical and Electrical Engineers.

## Nation-Wide Inquiry Into Distribution Problems

Machinery for carrying on a national investigation of the processes of merchandising and distribution was set up by the National Distribution Conference recently held in Washington.

The scope of the inquiries to be carried on by six permanent committees, each covering a different phase of the general problem, was outlined by the conference, and five permanent chairmen were appointed to take charge of the work. By special resolution the Conference requested Secretary Hoover to designate the members of the committee on business statistics, for the chairmanship of which, it is understood Owen D. Young is under consideration.

After designating the permanent chairmen and adopting a resolution commending the efforts of Secretary Hoover to reduce wastes arising from distribution the Conference adjourned to meet later in the year to receive the reports of the special committees.

A far-reaching task was outlined by the Conference for the investigating committees which will take up the work in detail. This includes a survey of existing statistical sources and suggestions for a clearing house of statistical information to obviate duplication by various trade associations; the analysis of trade practices and the devising of methods for correcting defects, and the determination of the proper functions of the various agencies of distribution now in existence.

## Financial

The special meeting of the American Hide & Leather Co. to reconsider plan of recapitalization has been deferred until Feb. 3.

The report of the Glidden Co. for the year ended Oct. 31 shows net profit of $1,078,906. This places earnings on a basis of $2.50 a share on the common stock, as compared with $1.98 in the preceding year.

The report of Endicott Johnson Corporation for the year ended Dec. 31, shows net profits of $4,175,644 after interest, depreciation, federal taxes, etc., equivalent after preferred dividends to $8.04 a share earned on $20,268,000 outstanding common stock. This compares with $4,154,279, or $7.95 a share, in 1923.

The Pittsburgh Plate Glass Co. has declared an extra dividend of 5 per cent in addition to the regular quarterly dividend of 2 per cent.

The National Lead Co. has declared the regular quarterly dividend of 1¾ per cent on the preferred stock, payable March 14.

## Latest Quotations on Industrial Stocks

| | Month Ago | This Week |
|---|---|---|
| Air Reduction | 88 | 88 |
| Allied Chem. & Dye | 83¾ | 83¾ |
| Allied Chem. & Dye pfd. | 118 | 117½ |
| Am. Ag. Chem. | 13⅝ | 14 |
| Am. Ag. Chem. pfd. | 38 | 44 |
| American Cyanamid | *100 | *117 |
| Am. Drug Synd. | 5⅝ | 6 |
| Am. Linseed Co. | 26 | 25¾ |
| Am. Linseed pfd. | 46 | 57 |
| Am. Smelting & Refining Co. | 90¼ | 98¼ |
| Am. Smelting & Refining pfd. | 106½ | 109 |
| Archer-Daniels Mid. Co. w.i. | 29 | 27¾ |
| Archer-Daniels Mid. Co. pfd. | 92 | 95 |
| Atlas Powder | 51 | 51½ |
| Casein Co. of Am. | *69 | *68 |
| Certain-Teed Products | 41¾ | 43¾ |
| Commercial Solvents "A" | 115½ | 137 |
| Corn Products | 40¼ | 39 |
| Corn Products pfd. | 120 | 118¾ |
| Davison Chem. | 44½ | 44¾ |
| Dow Chem. Co. | *54 | *55 |
| Du Pont de Nemours | 136½ | 141¾ |
| Du Pont de Nemours db | 94¾ | 94½ |
| Freeport-Texas Sulphur | 10 | 10 |
| Gold Dust | *40½ | 40 |
| Grasselli Chem. | *124 | *125 |
| Grasselli Chem. pfd. | *103 | *102 |
| Hercules Powder | 97 | 96 |
| Hercules Powder pfd. | 105 | 106 |
| Heyden Chem. | 2½ | 2¼ |
| Int'l Ag. Chem. Co. (new) | 6½ | 10 |
| Int'l Ag. Chem. pfd. (ctfs.) | *52 | 49 |
| Int'l Nickel | 24½ | 26 |
| Int'l Nickel, pfd. | *93 | *94 |
| Int'l Salt | *76 | *72 |
| Mathieson Alkali | 54 | 53 |
| Merck & Co. | 60 | *60 |
| National Lead | 158½ | 159¾ |
| National Lead pfd. | 116½ | 116½ |
| New Jersey Zinc | 187 | 190 |
| Parke Davis & Co. | *82 | 82 |
| Pennsylvania Salt | *84 | *84½ |
| Procter & Gamble | *110 | *111 |
| Sherwin-Williams | 31 | 35¼ |
| Sherwin-Williams pfd. | 100⅝ | 105 |
| Tenn. Copper & Chem. | 8½ | 8⅝ |
| Texas Gulf Sulphur | 101¾ | 103⅝ |
| Union Carbide | 66 | 67½ |
| United Drug | 116 | 116½ |
| United Dyewood | 26½ | 25½ |
| U. S. Industrial Alcohol | 82⅜ | 82¾ |
| U. S. Industrial Alcohol pfd. | *107 | *107 |
| Va.-Car. Chem. Co. | 2 | 2⅛ |
| Va.-Car. Chem. pfd. | 7⅛ | 9⅝ |

*Nominal. Other quotations based on last sale

## Imports of Chemicals Gain in November

**Exports Fall Off Sharply From October Totals—Coal-Tar Chemicals Lead in Decline**

Imports of free list chemicals increased decidedly during November, the returns to the Department of Commerce show. There was a slight increase in imports of dutiable chemicals. The value of free list chemicals imported during November was $7,950,928, more than $1,000,000 greater than the value of comparable imports during October and $3,500,000 greater than these imports of November, 1923. November imports of dutiable chemicals were valued at $3,251,373, also a substantial increase over the volume of that trade in November, 1923.

The continued heavy importation of fertilizers accounts for a considerable portion of the increase over November of 1923. The increased imports of nitrate of soda leads the list. Sulphate of ammonia contributes importantly. Guano, dried blood and tankage, of which there was no movement in November, 1923, were imported in large quantities during November, 1924. The increase in cyanamide importations was only slight, but that of calcium nitrate was greater in 1923. The same is true of bone phosphate and some of the potash fertilizers, although receipts of muriate were much heavier.

The upturn in imports of coal-tar chemicals was decided but not of particular significance. The value of all imports in that class in November was $2,013,218, about half a million dollars greater than the total for November, 1923, and slightly more as compared with October, 1924. Practically all of the increase is accounted for in the sharp upturn of creosote oil receipts. Imports of white arsenic continue to decrease and are now being received at one-fifth of the peak rate. Detailed figures for certain commodities follow:

| | November, 1923 | November, 1924 |
|---|---|---|
| White arsenic, lb. | 1,566,775 | 799,443 |
| Citric acid, lb. | 448,000 | 56,000 |
| Formic acid, lb. | 67,004 | 70,462 |
| Oxalic acid, lb. | 144,262 | 381,698 |
| Tartaric acid, lb. | 358,198 | 109,760 |
| Copper sulphate, lb. | ..... | 167,143 |
| Carbonate of potash, lb. | 1,290,237 | 705,361 |
| Hydroxide of potash, lb. | 915,592 | 1,571,669 |
| Chlorate of potash, lb. | ..... | 851,172 |
| Cyanide of soda, lb. | 1,061,367 | 3,067,595 |
| Ferro cyanide of soda, lb. | 50,060 | 261,159 |
| Nitrate of soda, lb. | 226,983 | 33,600 |
| Sodium nitrate, tons | 30,456 | 65,664 |
| Creosote oil, gal. | 3,814,248 | 10,455,942 |
| Naphthalene, lb. | 1,311,945 | ..... |

Exports of chemicals and allied products in November were valued at $9,164,856. This is $900,000 less than the value of exports in October, but is slightly in excess of these exports in November, 1923.

The decline was well scattered through the list, no significant reductions having taken place in any of the major groups. Forwardings of sodas and sodium compounds in November were 27,443,486 lb.; of fertilizers 78,366 tons; of explosives 996,917 lb., while the month's exports of coal-tar products were valued at $663,056. The decreases in the last two items mentioned were appreciable. The benzol trade all but flattened out entirely, as have the forwardings of smokeless powder. The comparative figures covering certain of the export commodities follow:

| | November, 1923 | November 1924 |
|---|---|---|
| Benzol, lb. | 3,451,149 | 84,277 |
| Sulphuric acid, lb. | 531,401 | 841,524 |
| Acetate of lime, lb. | 1,424,157 | 3,512,131 |
| Bleaching powder, lb. | 1,415,637 | 1,538,509 |
| Chlorate of potash, lb. | 14,008 | 4,169 |
| Soda ash, lb. | 2,983,399 | 3,838,019 |
| Caustic soda, lb. | 9,559,114 | 7,696,929 |
| Sulphate of ammonia, tons | 6,689 | 11,930 |

## Changes Sought in Methods of Leasing Potash Lands

In an effort to harmonize the methods of handling potash deposits with the provisions of the general leasing act, an attempt is being made to secure legislation at this session of Congress to put potash on all fours with the other minerals in the leasing act. This legislation is intended to supersede the act of 1917, which, among other things, awards an unlimited patent to one-fourth of the area embraced in the prospecting permit. The omission of any authority for the exercise of discretion in granting such permits and the possibility of obtaining title to valuable mineral substances other than potash, as well as the probability that the only lands in the permit containing potassium may be patented, are other objections to the existing statutes. It also has developed that patented lands, in some cases, have been taken with a view to isolating other lands so that the leasing of the remainder would not be probable because of their small area and the ease with which they could be drained of their brine by surrounding lands.

## Trade Notes

A report from Casablanca states that the production of phosphates in Morocco during 1924 exceeded 436,000 tons; this was twice the 1923 production.

The German dye cartel has embarked upon the production of fixed nitrogen in Norway. While this step is said to have been taken largely to secure cheap hydro-electric power, the transaction also involves process rights which are to be applied in connection with the Birkeland-Eyde process.

F. V. Glynn has been elected an assistant secretary of the U. S. Rubber Co. He will continue to act as secretary to the chairman of the board.

A charter was filed last Wednesday at Dover, Del., for the Essex Cotton Mills, Inc., with a capital stock of $38,000,000. Arthur W. Britton, Samuel C. Wood and John W. Worrall, all of New York City, were named as the incorporators.

The property of the Butterworth-Judson Corporation on Newark Bay was sold at public auction on Jan. 21. The property was offered in twelve separate parcels and brought a total of $562,000.

# Men You Should Know About

ROBERT D. BENSON, chairman of the board of directors of the Tide Water Oil Co., New York, has sailed for a trip to the Mediterranean, accompanied by Mrs. Benson.

CHARLES CONNICK, a Boston stained glass manufacturer, gave a public lecture on the art of making stained glass on Jan. 24, under the auspices of the Boston University art department.

W. R. CREADICK, safety engineer for E. I. du Pont de Nemours & Co., Wilmington, Del., was the principal speaker at a meeting of the Industrial Safety Executives, Delaware Safety Council, Wilmington, Jan. 5, dealing with "Plant Safety Inspections."

W. V. CRUESS, of the fruit products division of the department of agriculture, University of California, addressed the members of the Southern California Section of the American Chemical Society at Los Angeles, Jan. 7, his subject being "The Olive and Citrus Industry of Europe."

A. H. D'ARCAMBAL, metallurgical engineer, Pratt & Whitney Co., Hartford, Conn., delivered an address before the members of the American Society for Steel Treating, Pittsburgh, Pa., at the William Penn Hotel, Jan. 6, on the subject "Hardening of Small Tools," illustrated with a number of interesting lantern slides.

HENRY W. DARLING, for more than 30 years treasurer of the General Electric Co., has resigned and on Jan. 1 was succeeded by R. S. Murray, who has been assistant treasurer of the company since 1910. In accepting the resignation of Mr. Darling as treasurer, the board of directors elected him a vice-president with such duties as shall be assigned to him by the president.

O. B. DENNISON, '11, executive secretary and treasurer of the Massachusetts Institute of Technology, Cambridge, Mass., has left the city for a trip to Philadelphia, Washington, Baltimore and other cities, where he will address several Technology clubs.

WALTER W. DRURY, executive engineer for the California Gas Research Council, has returned to Los Angeles after a professional trip to San Francisco and the Pacific Northwest.

Dr. W. F. FARAGHER of the Mellon Institute, Pittsburgh, delivered two lectures on distillation before the students in chemical engineering at Columbia University on Jan. 12 and 13.

Prof. ALEX. FINDLAY, of the chemistry department of the University of Aberdeen, Scotland, has been appointed acting professor of chemistry at Stanford University, Calif., for the winter, spring and summer seasons. He will come to the United States next month.

HENRY FEYRER, formerly assistant in the chemical laboratory of the Remington Arms Co., has joined the staff of the chemical laboratory of the Bridgeport Brass Co.

Dr. MOSES GOMBERG, professor of organic chemistry at the University of Michigan, has been awarded the Willard Gibbs medal.

R. E. GOODWIN, vice-president of the Paragon Refining Co., Toledo, Ohio, has resigned. He will engage in business on his own account.

L. M. HENDERSON has resigned his position with the University of Minnesota to join the research department of the Atlantic Refining Co.

HARRY HODGETTS, of the Tatesville Silica Sand Co., Everett, Pa., has taken over the enterprise for the development of greater tonnage of special sands—that is, glass, sand blast, filler, furnace, etc., and amorphous silica.

CHARLES F. HORAN, of the Hood Rubber Co., Watertown, Mass., delivered an address before the Massachusetts Safety Council, Jan. 6, at the John Hancock Life Insurance Building, on the subject "Falls Inherited From Old Adam."

HENRY JOHNSON, managing director of Courtaulds, Ltd., London, England, manufacturer of artificial silk, has arrived in the United States and will take charge at once of the Viscose Co., manufacturer of kindred products, with plants at Marcus Hook and Lewistown, Pa., and Roanoke, Va.

SEDGWICK KISTLER of the Kistler Leather Co., Boston, Mass., has sailed for a trip to Europe, and will be abroad for a number of weeks.

DAVID D. LONG, heretofore connected with the educational division of the Southern Fertilizer Association in soil improvement work, has become connected with the International Agricultural Corporation, New York, manufacturer of fertilizers, etc.

O. C. MARTIN will sail the first of February for Europe, where he will take up his duties as consulting metallurgist with the Société Générale Metallurgique de Hoboken and the Union Minière du Haut Katanga, with offices in Brussels and Antwerp. Mr. Martin will superintend the construction and operation of a refinery which these companies intend to build at Colen, Belgium. Mr. Martin's recent position was plant manager of the Maurer plant of the American Smelting & Refining Co. Before that he was manager of the Nichols Copper Co.'s plant located at Laurel Hill, L. I.

R. S. MCBRIDE presented an address as the retiring president of the Chemical Society of Washington (local section of the American Chemical Society) on Jan. 8, speaking on the subject "The Chemical Substance Called 'Coal'."

LOUISE E. MCGRATH, chief chemist of the Booth Chemical Co., Townley, N. J., will deliver an address on "White Water Coagulation," before the members of the Canadian Pulp and Paper Association at its annual meeting in Montreal, Jan. 29. Miss McGrath has the distinction of being the first woman ever to read a paper before the organization; she is a graduate of Hunter College, New York, class of '18, with a degree of B.A.

P. J. MCQUIRE is with the Kennard Engineering Co., Los Angeles, Calif.

E. N. MCKELVEY, assistant to the president, Wheeling Steel Corporation, Wheeling, W. Va., has been appointed general manager of the Steubenville, Ohio, works of the company, succeeding A. J. McFarland, resigned.

CHARLES R. MONTGOMERY, for the past 17 years secretary of the Pittsburgh Plate Glass Co., Pittsburgh, Pa., has resigned, effective Jan. 1, owing to poor health.

Prof. JAMES F. NORRIS, of Massachusetts Institute of Technology, and president of the American Chemical Society, will address the New Haven Section of the American Chemical Society, Jan. 27, on "Factors Influencing the Reactivity of Atoms and Groups in Organic Compounds."

CHESTER H. PENNING returned to Washington, Jan. 5, after an absence of 7 months. During this period Mr. Penning made an extensive tour of Japan, Manchuria and north China, obtaining data for the Tariff Commission in its investigation of vegetable oils.

CARL RABES, director of the Thyssen Iron & Steel Works, Germany, a visitor in the United States for several weeks past, sailed for home, Jan. 10.

Dr. F. O. RICE, professor of organic chemistry at Johns Hopkins University, Baltimore, Md., tendered an address before the members of the Maryland Section of the American Chemical Society on Jan. 9, in the new chemistry building at Johns Hopkins, speaking on the subject "Hydration of the Hydrogen Ion." CARL HANER, superintendent of the United States Industrial Chemical Co., Baltimore, also spoke before the gathering on "Some Wild Engineering Ideas I Have Known."

FRED E. ROGERS was the principal speaker at a meeting of the New Jersey Chemical Society at the Essex Club, Newark, Jan. 12, dealing with the subject "The Oxy-Acetylene Process."

Prof. GAR A. ROUSH, associate professor of metallurgy at Lehigh University, has just been commissioned Major in the Officers Reserve Corps. Professor Roush accepted this post at the request of the Assistant Secretary of War in order to serve as special lecturer on strategic minerals at the Army Industrial College in Washington, and will devote a week, twice each year, to this work.

Dr. B. D. SAKLATWALLA, heretofore general superintendent at the Bridgeville, Pa., plant of the Vanadium Corporation of America, has been elected vice-president of the company and also of the affiliated organization, the United States Ferro Alloys Corporation. GUSTAV LAUB has been appointed assistant secretary of both companies.

W. W. SCOTT, formerly with the United States Bureau of Mines and

now connected with the Anglo-Saxon Petroleum Co., is now in Borneo on a mission for his company, accompanied by Mrs. Scott.

B. W. SIDWELL has become supervisor of plants for the Universal Gypsum Co., Chicago, Ill. He was formerly secretary and treasurer of the Gypsolite Co., of the same city.

HOMER F. STALEY, manager of the ceramic department of the Metal & Thermit Corporation, New York, has left for a business trip to the Pacific coast, and will be absent for several weeks.

W. R. WAELTY, chief chemist for W. P. Fuller & Co., San Francisco, addressed members of the California Section of the American Chemical Society on Jan. 9, on "White Lead Manufacture." Prof. W. C. BRAY, of the University of California, spoke on "Oxidation and Reduction Reactions of Inorganic Nitrogen Compounds."

Dr. C. A. WILLAT is in Boston.

At a meeting of the Rubber Association of America, W. O. RUTHERFORD was re-elected president. T. W. MILLER, of the Faultless Rubber Co., Ashland, Ohio, and C. H. DANIEL, president of the Quaker City Rubber Co., Philadelphia, Pa., have been elected directors of the association.

## Obituary

### Norman Bridge

The death at Los Angeles on Jan. 10 of Dr. Norman Bridge recalls the details of a career in which the scientific ideal formed the mainspring of effort, the fulfillment of which was aided by a good fortune that comes to but few of his type, enabling him to make discriminating benefactions to educational advance. He was born in 1844 at Windsor, Vt., of New England stock. After early years at school and at work on his father's farm he entered the University of Michigan as a medical student. After graduation at the Northwestern University he was appointed assistant demonstrator in anatomy. This was followed by professorships at other medical colleges, held for long periods. At the time of his death he was emeritus professor of Rush Medical College. Ill health brought him to California in 1892. In 1901 he laid the foundations of his fortune by the judicious investment of $5,000 in the Mexican Petroleum Corporation, of which he later became vice-president and treasurer. His gifts in the cause of educational advance included large donations to the California Institute of Technology at Pasadena, whereby the Norman Bridge Laboratory was built and endowed. He was an author of several treatises on medical and allied subjects, and a stanch upholder of the value of research in industry. A. W. ALLEN.

E. E. ALLEN of Warren, Pa., treasurer of the Cornplanter Refining Co. for a number of years prior to its acquisition by the Pure Oil Co., died suddenly at his home, Jan. 7. He was well known in the petroleum industry.

JAMES W. BEARD, controller of the International Nickel Co., New York, died Jan. 1, on board the steamship "Olympic" en route to England on a business trip.

FREDERICK W. FINK, prominent in the drug and chemical industry, founder and former head of the firm of Lehn & Fink, New York, died early in January, at Fulda, Germany, where he had been spending the holidays with his brother and sister. He was born at Cassel, Germany, in 1846, and retired from active business in 1898.

L. LESLIE HAMMER, general manager of the N. & G. Taylor Co., Cumberland, Md., manufacturer of tin plate, died of typhoid fever, at the age of 47 years. He started work with the Taylor company many years ago as chemist in the open-hearth department. In 1903 he was made superintendent of the black plate department and in 1916 became general manager, also being elected to the board of directors, becoming assistant secretary-treasurer.

GLENN GRENVILLE HOWE, for many years senior vice-president of the Link-Belt Co., passed away at his home in Muskegon, Mich., Christmas day, after a long illness. His first position was as a 16-year old office boy in 1877. Following his mechanical bent, he drifted into the manufacturing department, and later became the superintendent of the Ewart Manufacturing Co. When the three related interests, the Ewart Manufacturing Co., the Link-Belt Machinery Co. and the Link-Belt Engineering Co., were merged into one as the Link-Belt Co. in 1906, Mr. Howe became vice-president, in charge of the company's Indianapolis operations. It was under his direction that the Belmont Malleable Iron Foundry and the Ewart assembly plant were built in 1913; and he continued as senior vice-president until failing health led to his retirement from active business. Later, with returning health, he organized the Howe Chain Co. at Muskegon, Mich., serving as president of the organization, which became a decided factor in chain making through his thorough knowledge of the art. About the end of 1923 Mr. Howe was stricken with the illness which finally resulted in his death. The sale of the Howe Chain Co. to the Link-Belt Co. was made in January, 1924, and the Muskegon plant is now operated as the Howe Chain Plant of the Link-Belt Co.

Dr. JOHN MARSHALL, emeritus professor of chemistry and toxicology at the University of Pennsylvania, died at Philadelphia, Pa., Jan. 5, following an extended illness, aged 69 years. He was a well-known specialist in the matter of poisons and problems of organic chemistry. Dr. Marshall was connected with the university for more than 40 years, succeeding his father-in-law, Prof. Theodore G. Wormley, in the chair of chemistry and toxicology in 1897. He retired in 1922.

JOSEPH L. MURPHY, treasurer of the Murphy Oil Co. of Pennsylvania, Philadelphia, Pa., and prominently identified with the oil industry for the past 20 years, died at the Hotel Belmont, New York, Jan. 8, of pneumonia, following a week's illness. He was 46 years of age.

RALPH C. RICHARDS, one of the organizers and fifth president of the National Safety Council, died at his home in Geneva, Ill., Jan. 3, after a long illness. Mr. Richards was 69 years old and had retired on July 1, 1924, from his position as claim agent of the Chicago & North Western Railroad, with which he had been associated for 54 years.

HENRY WOOD, former president, general manager and director of the Henry Wood's Sons Co., dry color and chemical manufacturer, of Boston, Mass., died on Jan. 4 at Alexandria, Va. Mr. Wood was born in Wellesley, Mass., in 1867 and was graduated from Harvard University in 1892. He then joined the Henry Wood's Sons Co. and was connected with the concern up to a few years ago, when he retired from active life. Mr. Wood was a director of the Waban Rose Conservatories. He was made president and general manager of the Henry Wood's Sons Co. in 1917.

## Calendar

**AMERICAN CERAMIC SOCIETY**, annual meeting, Columbus, Ohio, Feb. 16 to 21.

AMERICAN CONCRETE INSTITUTE, annual meeting, Chicago, Ill., Feb. 24 to 27.

**AMERICAN ELECTROCHEMICAL SOCIETY**, Niagara Falls, April 23 to 25.

AMERICAN ELECTROCHEMICAL SOCIETY (in charge). Joint meeting with Society of Chemical Industry, Société de Chimie Industrielle and American Chemical Society, Chemists Club, New York, Feb. 6.

**AMERICAN PULP AND PAPER MILL SUPERINTENDENTS ASSOCIATION**, Niagara Falls, N. Y., June 4 to 6.

**AMERICAN MANAGEMENT ASSOCIATION**, annual convention, Hotel Astor, New York, Jan. 28, 29 and 30.

AMERICAN WOOD PRESERVERS ASSOCIATION, annual meeting, Chicago, Ill., Feb. 3 to 5.

**BRUSSELS INTERNATIONAL AND COMMERCIAL FAIR (sixth)**, Brussels, Belgium, March 25 to April 8.

**CANADIAN PULP AND PAPER ASSOCIATION**, Montreal, Jan. 28 to 30.

**NATIONAL EXPOSITION OF CHEMICAL INDUSTRIES**, New York, Sept. 28 to Oct. 3.

ENGINEERING INSTITUTE OF CANADA, annual meeting, Montreal, Jan. 27 to 29.

**SOUTHERN EXPOSITION**, Grand Central Palace, New York, May 11 to 23.

**TECHNICAL ASSOCIATION OF THE PULP & PAPER INDUSTRY**, Waldorf-Astoria, New York, Feb. 3 to 5.

## Industrial Notes

The Electric Heating Apparatus Co. has changed its office from Newark to Milwaukee, and is now known as the Hevi-Duty Electric Co. A New York office has been opened at 150 Broadway, where the company is represented by Lawrence W. Hayden and Irving H. Ball.

O. L. Chapman has joined the sales organization of the Scott Valve Manufacturing Co. of Detroit.

The Hirshler Metals Co. announces its removal to 25 Broadway, New York City.

The Denver Fire Clay Co., Denver, Colo., announces a branch office at 90 West St., New York. E. S. Tompkins will have charge of the office and is informed on fireclay products and can give prices and detailed information covering the company's complete line.

# Market Conditions

## Heavy Chemicals Move Freely Against Existing Contracts

### New Business Shows Gradual Improvement—Lack of Selling Pressure Holds Values on Steady Basis

THERE was a good call for contract deliveries of chemicals in the past week. Consuming industries are operating on a fairly active scale and consumption of chemicals is benefited accordingly. Spot trading is affected by the fact that many consumers are covered ahead but inquiry for additional lots has made headway and gradual improvement is shown in buying orders.

The glass trade is taking a relatively large amount of chemicals. Some glass factories are reported to have sold their output for the entire year. Demand for window and plate glass is good and the outlook for the industry is bright. Other industries which offer a large outlet for chemicals have improved their positions in recent months and the gain in general industrial activity is reflected in the market for chemicals and other raw materials.

The weighted index number for the week was 113.39 as compared with 113.45 for the preceding week. The slight decline was largely due to the easier position of some coal-tar chemicals, notably benzene. As announced in our issue of last week, the index number is now based on the price movement of chemicals only and a separate index number for vegetable oils will be found on another page. The tendency of prices for chemicals is now steady to firm. Important basic chemicals are not expected to fluctuate to any extent. Most other chemicals are influenced by lack of selling pressure, steady markets abroad, and a widening in consuming outlets.

Of interest in the market was a report that prices for potash salts may be expected to advance. This appears to be based on a rumor from Germany. The agreement reached early last year by French and German producers of potash destroyed hopes of a competitive market and gives a basis for credence in the current rumor. The fact that a large part of American requirements are to be filled by French producers is given as the motive which is actuating German producers to establish higher selling prices.

#### Acids

Considerable quantities of oxalic acid were imported in the past week but there was nothing to verify reports that foreign-made acid was being rushed to this country before the higher import tariff went into effect. Interest in oxalic has been sustained by the general belief that prices would remain at high levels and consumers have been eager to cover ahead. Sellers did not attempt to run prices up and quotations were kept at 10½@11c. per lb. The lower grades of acetic acid are in fair demand but competition is said to be keen on the higher grades. Citric acid has held a steady course and spot values are reflecting the firm position of primary markets abroad. Asking prices remained at 45½@46c. per lb., with domestic acid offered at the outside figure. Lactic acid is firmly held with buying showing expansion. Tartaric acid is quiet on spot but futures have attracted some attention and sellers are not granting price concessions as they look for trading to improve and replacement costs are high. Sulphur acid is fairly active. Producers are carrying orders for future delivery and are shipping out regularly. Prices are firm and surplus stocks have been reduced materially. Other mineral acids are following sulphuric with sellers in a favorable position.

**Firmer Markets for Bichromates — Prussiate of Soda Offered at Lower Prices—Decline in Benzene—Good Contract Movement of Alkalis—Arsenic Dull and Weak—Copper Sulphate Strong—Interest in Oxalic Acid—Mineral Acids Hold Steady Position**

#### Potashes

**Bichromate of Potash** — There has been a moderate gain in inquiries since the first of the year but buying is spasmodic. Producers no longer are quoting at low price levels and asking prices are now given at 8½c. per lb. as an inside figure.

**Carbonate of Potash** — Trading in 80-85 per cent calcined carbonate is still restricted by the scarcity of offerings on spot and values are more or less nominal at 6c. per lb. On shipments from abroad 6c. per lb. is asked with a possibility of shading. Moderate amounts of 96-98 per cent are moving at 6½@6⅝c. per lb. on spot and 5¾@6c. per lb. on shipment. Hydrated is quiet with spot goods on the market at 5@5½c. per lb.

**Caustic Potash**—Imports of caustic potash in November were heavy, amounting to 1,571,669 lb. as compared with 915,592 lb. in November, 1923. Spot supplies are said to be rather large and prices have held at 7¼c. per lb. and upward according to seller and quantity. On shipments from abroad 7¼c. per lb. can be done.

**Chlorate of Potash** — Arrivals of chlorate of potash from foreign markets have moved, in large part, direct to consumers and spot holdings are said to be moderate. Inquiry for moderate sized amounts has found sellers reserved with 7c. per lb. an inside quotation. Nearby shipments from abroad were quoted at 6½c. per lb. Perchlorate of potash has been of interest with offerings limited and foreign material is largely nominal both on spot and for prompt shipment.

**Prussiate of Potash**—Different prices have been quoted for yellow prussiate of potash in the spot market and in some quarters as high as 20c. per lb. has been asked. General asking price was 18½@19c. per lb., but at these prices consumers became inactive and holders of stocks were more susceptible to bids with the result that values appeared less firm last week. This is further shown by reports that spot material could be bought at 18c. per lb.

#### Sodas

**Bichromate of Soda**—There was a good contract movement in the latter part of last year. Some producers were accepting business with price apparently secondary. The situation has now changed and consumers who are not covered are finding a firmer front on the part of sellers. Spot holdings also are firmer and open quotations now give 6½c. per lb. as the lowest trading price. It is predicted that consumption in the first half of this year will be larger than in the corresponding period of last year. Indian chrome ore is offered at $21 per ton, c.i.f. Atlantic ports.

**Caustic Soda**—A steady call for deliveries against contracts is reported. Large consuming industries are taking normal amounts of caustic. Jobbing business is reported as normal with a broadening in demand looked for in the near future. Prices are on a steady basis with contracts offered at $3.10 per 100 lb. in carlots, f.o.b. works. Export demand has not been especially active. Quotations for export continue to show a range, according to seller and point of destination, the prices showing a high of $3.10 per 100 lb. f.a.s. and a low of $2.90 per 100 lb. Exports in November were officially reported at 7,696,929 lb. as compared with 9,559,114 lb. in November, 1923.

**Fluoride of Soda**—The market is not active but inquiry was present for small lots and values are holding on a steady basis. Sellers offer spot fluoride at 9@9¼c. per lb. and shipments at 8¾@8¾c. per lb.

**Nitrate of Soda**—Production of nitrate in Chile last month is reported at 215,000 tons with shipments at 300,000 tons. Stocks on hand at the end of the year were 882,000 tons. The local market for nitrate has held fairly steady with spot quoted at $2.62½ per 100 lb. Premiums are still asked for later deliveries. Imports of nitrate in November amounted to 65,664 tons.

**Prussiate of Soda**—There was an easier tone to this market and the attempt to hold prices up to the 10½@11c. per lb. level was found to be difficult. At the higher prices buying slowed up and demand was further checked by reports of a slowing up in an industry which is one of the largest consumers of prussiate. Resale offerings were reaching the market at prices under those asked by first hands. The latter were offered at 10½c. per lb. and in the latter part of the week there were offerings available on spot at 10c. per lb. Imports of prussiate in November were 261,159 lb.

### Miscellaneous Chemicals

**Acetate of Lime**—The Department of Commerce has just announced that production of acetate of lime in November was 10,305,653 lb. as compared with 9,803,414 lb. in October. Stocks on hand at the end of November were given as 11,854,988 lb., which represents a sharp decline and also indicates that consumption at points of production must have been unusually large, as shipments have not been heavy enough to cause much reduction in surplus holdings. Export buying has been quite active with a fairly steady movement to domestic consumers. Market quotations are held at $3 per 100 lb.

**Arsenic** — Domestic producers are offering round lots of arsenic at 5¾c. per lb. and the lower price quoted is proof of the slow call from consumers. It is reported that producers on the first of the year had surplus stocks in excess of 5,000 tons. It is freely admitted that stocks are large and until the slack has been taken up the market will hardly be in a position to recover. Imported grades are not finding an outlet large enough to absorb offerings and preponderance of supply over demand is weakening values. Spot imported is variously quoted from 5½c. to 6c. per lb.

**Barium Carbonate** — Recent buying has reduced spot supplies and sellers are firm in their views and ask $55 @$58 per ton, although these prices are not free in view of the limited offerings. Barium chloride also is strongly held with spot at $64@$65 per ton and shipments at about the same level.

**Copper Sulphate**—Imported sulphate has been less in evidence and with demand gaining in volume domestic producers are quoting more in harmony with producing costs. Leading brands are now held at 4.80@4.90c. per lb.

**Sal Ammoniac**—Demand for imported white sal ammoniac was not active. Sellers are well supplied with material and were willing to accept 5¾c. per lb. for spot material. Shipments from abroad also were offered at 5¾c. per lb. Gray was quiet at 7¼c. per lb. on spot and lump held at 12@12½c. per lb.

**Chem. & Met. Weighted Index of Chemical Prices**

Base = 100 for 1913-14

| | |
|---|---|
| This week | 113.39 |
| Last week | 113.45 |
| Jan., 1924 | 120.08 |
| Jan., 1923 | 124.31 |

The weighted index number for chemicals closed 0.06 lower on the decline in benzene. Higher prices were asked on copper sulphate and prussiate of soda.

### Alcohol

The supply situation in the market for denatured alcohol is not so tight as it was and this has placed consumers in a more favored position, although no change in prices occurred. Demand for both completely and specially denatured alcohol remains good. No. 5 completely held at 54@55c. per gal., in drums, carload basis.

Butyl alcohol was steady at the recent advance to 27@28c. per lb., with production well sold up.

Methanol was offered freely and prices were unsettled. Production in November amounted to 560,904 gal., which compares with 539,333 gal. in October and 756,746 gal. in November a year ago.

Quotations for 97 per cent methanol held at 72@74c. per gal., in drums, as to quantity, with the 95 per cent grade at 70@72c. per gal. Pure, in tank cars, works, 74c. per gal.

# Coal-Tar Products

## Benzene Prices Decline—More Buying Interest in Toluene—Byproduct Coke Output Gains in December

LEADING producers announced a lower price schedule on both the 90 and pure grades of benzene, the reduction amounting to 2c. per gal. The decline in the market was regarded as an indication that producers are anxious to stimulate consuming interest in the refined grades. There was no change in the position of toluene, solvent naphtha and xylene. Distributors reported a good call for toluene, with stocks rather low and prices steady to firm. The Geological Survey placed production of byproduct coke for the month of December at 3,067,000 tons, which compares with 2,929,000 tons in November and 2,445,000 tons in August. Byproduct ovens contributed 77.8 per cent of the 1924 output of coke, which compares with 66 per cent in 1923. Of the 75 plants, 68 were in operation in December. Demand for intermediates was fair, but offerings for most of the items appeared ample and prices, with the exception of aniline oil, were more or less nominal. Aniline oil was firm on the 16c. carload basis. Foreign markets for creosote oil were firmer.

**Aniline Oil and Salt**—There was a good movement of aniline oil into consuming channels on existing contracts and this tends to strengthen the market. New business also was fair and producers experienced no difficulty in trading on the 16c. per lb. carload basis, drums extra, f.o.b. works. Aniline oil for red was nominally unchanged at 40c. per lb. Salt was barely steady at 22@23c. per lb.

**Benzene**—The feature in the market was the decline in prices for the 90 per cent and pure grades. First hands lowered prices 2c. per gal., establishing the 90 per cent grade at 21c. per gal. and the pure at 23c. per gal., tank car basis, f.o.b. works. There has been a gain in production and it is believed that larger quantities of crude material will be refined should demand improve sufficiently.

**Beta-Naphthol**—Demand was moderate only, but prices ruled steady at 24@25c. per lb., depending upon the quantity.

**Creosote**—Advices from Manchester, England, reported firmer prices for creosote oil, the range at the close being 6¼@6½c. per gal., loose, prompt and nearby shipment from works. The buying has not been active, but inquiry has improved and it is expected that some sizable business with America may develop shortly.

**Cresylic Acid**—Trading restricted to actual wants and prices were irregular, favoring buyers. Quotations on the 97 per cent grade ranged from 59@63c. per gal., the inside figure obtaining on carload lots, works.

**Naphthalene**—The market for refined flake was steady so far as leading producers were concerned, but outside traders were inclined to offer more freely and the undertone in some directions was barely steady. Demand was moderate. Consumers anticipate a shortage in supplies this spring and this accounts for the conservative character of trading. White flake held at 5½c. asked. with ball at 6½c. asked. Chipped material was nominal at 4½ @5c. per lb. Crude to import nominal at 2c. per lb., c.i.f. basis.

**Phenol**—There were offerings of U.S.P. phenol for immediate delivery at 23c. per lb., large drums, and 24c. per lb., small drums. Demand outside of the phenolic resin industry was slow and this has resulted in increased offerings.

**Pyridine**—Inquiry was better and this steadied prices for spot goods, holders asking from $4.15@$4.25 per gal.

**Solvent Naphtha**—The undertone was barely steady, but no change occurred in the trading basis. Stocks were light. Water white naphtha was offered by producers at 24c. per gal., tank car basis, f.o.b. works.

**Toluene**—With production of toluene restricted and the demand very much better than it has been for some time past the undertone of the market has steadied. Prices were quotably unchanged, however, business passing at 26c. per gal., tank cars, prompt shipment from works.

# Vegetable Oils and Fats

## Crude Cottonseed Lower —Unsettled Market for China Wood, Corn and Coconut Oils—Moderate Decline in Tallow

TRADING in vegetable oils was less active and this brought out a slight reaction in prices. At the decline consumers appeared more inclined to take on material and the undertone steadied just before the close. The weighted index number for oils and fats reflected the decline in crude cottonseed, crude corn, china wood and coconut oils, as well as the drop in tallow, and was lowered to the extent of 2.82 points, settling at 155.20. Inquiries were in the market for linseed oil for May-June delivery.

**Cottonseed Oil**—The course of prices was very much in line with that of commodity markets in general. For a time prices were easy on the dip in pure lard and reports of slow cash business in compound and oil. Later the situation improved on new highs for wheat and a recovery in hog products. Crude oil sold in the Southeast at 9¼@9¼c. per lb., tank cars, f.o.b. mills, and at 9c. per lb., tank cars, f.o.b. Texas points. Quite a little crude oil changed hands at these prices. Trading in the option market for refined prime summer yellow oil was quiet, with sentiment mostly bullish. January P.S.Y. closed on Thursday at 11.15@11.25c. per lb., while May settled at 11.41@11.44c. per lb. In the Chicago lard market the May option was quoted at 16.60c. per lb., or 518 points higher than cottonseed oil. The question of changing the Produce Exchange contract on prime summer yellow oil to a deodorized oil basis was raised during the week, but no definite action was taken. Refiners and compound makers opposed a change in the standard contract. The Bureau of Census statistics for the 5 months ended Dec. 31 revealed a weaker supply situation, the visible increasing 257,000 bbl. for the month. Distribution of refined oil in December fell below expectations, amounting to 238,000 bbl., which compares with 281,000 bbl. for October. Lard compound closed the week at 13¼@13⅜c. per lb., carlots, f.o.b. New York, a decline of ¼c. Pure lard stocks in the Chicago district on Jan. 15 amounted to 38,296,425 lb., as against 20,345,742 lb. on Jan. 1 and 9,591,901 lb. a year ago.

**Linseed Oil**—Early in the week several crushers accepted bids at slight concessions from the open market basis, both on prompt and forward deliveries, but before the close the undertone steadied on strength in seed and weakness in cake. February oil sold at $1.13 per gal., carload basis, in bbl., while May-June sold at $1.15. At the close $1.15 was asked for spot and nearby, and $1.16@$1.17 for May-June. Few sellers were willing to take on June forward except at a premium. Business placed was not large in volume, but crushers were encouraged by improvement in inquiry. Trading in imported oil fell flat; offerings at $1.10 per gal. duty paid attracted no buyers. Foreign oil was offered ex-dock, immediate delivery, at $1.08 per gal., cooperage basis. The second official estimate on the Argentine flaxseed crop did not vary greatly from the first forecast, the yield being placed at 52,800,000 bu. This would provide for an exportable surplus of approximately 46,800,000 bu. The fact that the Argentine market for seed held comparative steady was taken as sufficient proof that most traders had little or no faith in the official report. Private estimates on the exportable surplus have not changed to any extent, ranging all the way from 32,000,000 to 40,000,000 bu. American crushers have been buyers of Argentine seed on a larger scale since the first of the year. Buenos Aires quoted the February option at $2.43⅛ per bu. Duluth prices advanced about 4c. per bu. in the past fortnight. Duluth quoted January seed at $3.07⅞, with May at $3.08⅞ per bu. Cake for export was offered freely and prices have eased off, closing around $47 per ton, f.a.s. New York.

### *Cottonseed Oil Stocks Gain During December*

Based on the Bureau of the Census statistics, the stocks of refined cottonseed oil on Dec. 31 amounted to 1,670,000 bbl., which compares with 1,413,000 bbl. in the preceding month and 1,348,000 bbl. a year ago. The holdings of refined include seed on hand and crude oil. The disappearance of oil for December was estimated at 238,000 bbl., which compares with 281,000 bbl. in November and 148,000 bbl. in December, 1923. Cottonseed and cottonseed products statistics for the 5 months ended Dec. 31, with a comparison, follow:

| | —Aug. 1 to Dec. 31— 1924 | 1923 |
|---|---|---|
| Seed received, ton.. | 3,752,440 | 2,727,676 |
| Seed crushed, ton... | 2,543,452 | 1,996,906 |
| Crude oil m'f'd., lb. | 760,849,329 | 586,666,586 |
| Ref'd oil m'f'd., lb.. | 591,073,708 | 396,234,471 |
| Stocks, Dec. 31: | | |
| Seed, ton..... | 1,223,863 | 741,949 |
| Crude oil, lb..... | 105,520,037 | 140,980,931 |
| Refined oil, lb.... | 232,930,407 | 146,827,664 |
| Exports, 5 months: | | |
| Crude oil, lb..... | 7,396,332 | 12,900,735 |
| Refined oil, lb.... | 15,845,425 | 6,502,902 |
| Cake & meal, ton | 255,486 | 69,572 |

**China Wood Oil**—Selling pressure was in evidence about a week ago and the market recorded sales at 13c. per lb., tanks, Pacific coast, and at 14⅜c. per lb., bbl., New York. Demand from varnish makers improved and final prices were higher, settling at 13½c., tanks, coast, and 15c., cooperage basis, New York.

**Corn Oil**—Crude corn oil sold at 10¼c. per lb., tank cars, f.o.b. Chicago.

**Coconut Oil**—Ceylon type oil sold at 9⅞c. per lb., February forward shipment from the Pacific coast, tank car basis. In New York 10⅜c. was asked, tank cars, nearby positions. The market was unsettled on quiet trading. Copra was firm.

### Chem. & Met. Weighted Index of Prices for Oils and Fats

Base = 100 for 1913-14

| | |
|---|---|
| This week | 155.20 |
| Last week | 158.02 |
| Jan., 1924 | 138.39 |
| Jan., 1923 | 134.77 |

Lower prices prevailed for crude cottonseed, coconut, corn, peanut and china wood oils, oleo oil and tallow, resulting in a decline of 2.82 in the weighted index number.

**Other Vegetable Oils**—Lagos palm oil sold for February shipment from Liverpool at 9.70c. per lb. Lagos for shipment from Africa was offered at 9.60c. per lb. Niger for shipment from Africa was nominal at 8⅜c. per lb., c.i.f. New York. English rapeseed oil held at 97c. per gal., with Oriental material on the market at 93½@95c. per gal. Crude peanut oil sold at 10⅜c. per lb., tank cars, mills, Southeast. Crude soya was offered at 11¼c. per lb., tank cars, duty paid, February shipment from San Francisco. Olive oil foots sold at 9½c. per lb., New York.

**Tallow, Etc.**—Soap makers bought several round lots of extra special tallow at 10¼c. per lb., f.o.b. melters' plants, which compares with 10¼c. per lb. a week previous. Early in the week outside brands equal to extra in quality sold as low as 10c. per lb. Yellow grease, choice, held at 9¼c. per lb. No. 1 oleo oil was offered at 14⅜c. per lb. Oleo stearine sold at 10⅝c. per lb., carload basis.

## Miscellaneous Materials

**Antimony**—Demand quiet and prices slightly lower. Chinese brands available at 17¼c. per lb. Cookson's "C" grade nominal at 19¼c. per lb. Chinese needle, lump, 10c. per lb. Standard powdered needle, 200 mesh, 11½@12c. per lb. Antimony oxide, white, Chinese, 99 per cent, 14⅜@15¼c. per lb.

**Feldspar**—Glassmakers' grade, 30-100 mesh, $19 per ton, Virginia points.

**Glycerine**—Crude soaplye, basis 80 per cent, offered at 12⅜c. per lb., loose, f.o.b. point of production, with bids in the market at 12½c. per lb. Undertone steady. Dynamite glycerine held at 18¼c. per lb., in drums, carload basis. Chemically pure offered at 19c. per lb., in drums, immediate shipment. Saponification, 88 per cent, nominal at 14c. per lb., loose, f.o.b. plant.

**Naval Stores**—Further strength developed in rosins on good demand for export and the lower grades advanced to $8.25@$8.35 per bbl. Spirits of turpentine in moderate request and prices steady at 93@93½c. per gal., in bbl., New York.

**White Lead**—Since the advance of ½c. per lb., which occurred in the preceding week, the market underwent no change. Pig lead was reduced ½c. per lb., leading producers establishing the market for the metal at 10c. per lb. This, naturally, weakened the undertone in the market for pigments. Corroders are taking business on a guarantee against decline basis. Standard dry white lead, basic carbonate, held at 12c., per lb., with the sublimed at 11½c. per lb.

# Imports at the Port of New York

**January 9 to January 22**

**ACIDS—Citric**—100 bbl., Messina, Order; 200 kegs, Genoa, Superfos Co.; 100 bbl., Messina, Order. **Cresylic** — 19 dr., Glasgow, American Hawaiian S. S. Co. **Oxalic** — 74 bbl. and 26 csk., Hamburg, Kachurin Drug Co.; 50 kegs, Rotterdam, I. M. Sobin Co.; 28 csk., Rotterdam, J. D. Lewis; 35 csk., Rotterdam, Order; 36 csk., Hamburg, Guaranty Trust Co.; 8 csk., Hamburg, Order. **Tartaric** — 650 csk., Genoa, Superfos Co. **Stearic**—62 bg., Rotterdam, Ponds Extract Co.

**ALCOHOL** — 2 csk. butyl, Rotterdam, Kuttroff, Pickhardt & Co.

**AMMONIUM CARBONATE** — 15 bbl., Liverpool, Order.

**ANTIMONY ORE**—693 bg., Antofagasta, W. R. Grace & Co.; 200 bg., Antofagasta, Watson, Geach & Co.

**ANTIMONY SULPHURET** — 250 csk., Bordeaux, Heemsoth, Basse & Co.

**ANTIMONY REGULUS**—100 cs., Hankow, Order; 230 cs., Shanghai, F. A. Cundill & Co.; 250 cs., Shanghai, B. C. Ritchie.

**ARSENIC**—1,532 bbl., Tampico, American Smelting & Refining Co.

**ASBESTOS**—2,334 bg. crude, Beira, W. D. Crumpton & Co.

**BARIUM OXIDE**—76 kegs, Rotterdam, W. A. Brown & Co.

**BARYTES**—1,698 bg., Genoa, Order; 1 lot (in bulk), Rotterdam, Ore & Chemicals Corp.; 71 csk., Rotterdam, Schall Color & Chem. Co.

**CASEIN**—834 bg., Montevideo, Bank of the Manhattan Co.; 500 bg., Montevideo, Order; 830 bg., Buenos Aires, Order; 1,334 bg., Buenos Aires, Kalbfleisch Corp.

**CHALK** — 300 tons, London, Baring Bros. & Co.; 280,000 kilos, Dunkirk, Taintor Trading Co.; 500,000 kilos, Dunkirk, American Exchange National Bank.

**CHEMICALS** — 100 bbl., Bremen, Mechanics & Metals National Bank; 100 cs., Rotterdam, Hans Hinrichs & Co.; 412 cs., Hamburg, Roessler & Hasslacher Chem. Co.; 100 csk., Rotterdam, Kuttroff, Pickhardt & Co.; 230 dr., Rotterdam, Kidder, Peabody & Co.; 110 pkg., Rotterdam, Roessler & Hasslacher Chemical Co.; 150 csk., Rotterdam, Stanley Doggett, Inc.; 274 bg., Glasgow, Brown Bros. & Co.; 52 csk., Rotterdam, A. Klipstein & Co.; 34 csk., Rotterdam, Seaboard National Bank; 200 bg., 120 csk. and 328 bbl., Rotterdam, Roessler & Hasslacher Chemical Co.; 67 csk., Rotterdam, A. Kastor.

**COLORS** — 22 csk., Hamburg, Kuttroff, Pickhardt & Co.; 6 csk. aniline, Franklin Import & Export Co.; 39 csk. alizarine, Rotterdam, Kuttroff, Pickhardt & Co.; 67 pkg. aniline, Rotterdam, H. A. Metz & Co.; 39 csk., Rotterdam, Grasselli Dyestuff Corp.; 6 pkg. aniline, Genoa, Ackerman Color Co.; 8 csk. do., Genoa, Backmeier & Co.; 65 pkg. aniline, Rotterdam, Grasselli Dyestuff Co.; 10 csk. anilin,e Rotterdam, Ciba Co.; 11 cs. aniline, Genoa, American Exchange National Bank; 11 pkg. aniline, Havre, Sandoz Chemical Works.

**EPSOM SALT**—500 bg., Hamburg, Order.

**FUSEL OIL**—45 dr., Rotterdam, Order; 7 dr., Antwerp, Order.

**GAMBIER** — 151 bg. cube, Singapore, Order.

**GLYCERINE**—180 dr. crude, Dunkirk, Core & Herbert; 53 dr., Buenos Aires, Order.

**GRAPHITE**—173 bbl., Genoa, Order.

**GUMS** — 192 bg. damar, Singapore, Brown Bros. & Co.; 140 cs. do., Singapore, Order; 128 cs. do., Singapore, L. C. Gillespie & Son; 128 cs. do., Singapore, Guaranty Trust Co.; 60 bg. copal, London, S. Winterbourne & Co.; 371 bg. kauri, Auckland, Chemical National Bank; 213 pkg. do., Auckland, L. C. Gillespie & Sons; 300 cs. do., Auckland, Baring Bros. & Co.; 1,463 pkg. do., Auckland, Order; 100 cs. damar, Singapore, Brown Bros. & Co.; 200 cs. damar, Padang, Standard Bank of South Africa; 110 cs. damar, Padang, G. H. Links; 250 cs. do., Padang, Order; 303 bg. damar and 313 pkg. copal, Singapore, Baring Bros. & Co.; 184 pkg. damar, Singapore, L. C. Gillespie & Sons; 256 bg. damar and 114 pkg. copal, Singapore, Standard Bank of South Africa; 498 bg. damar, Singapore, Order, 665 bg. karaya, Bombay, Order; 242 bg. yacca, Adelaide, Order.

**IRON OXIDE**—40 csk., Liverpool, J. A. McNulty; 52 csk., Liverpool, Reichard-Coulston, Inc.; 44 csk., Liverpool, Order.

**IRON POWDER**—12 cs., Bremen, Mallinckrodt Chemical Works.

**LITHOPONE** — 20 csk., Rotterdam, Philipp Bros. Inc.; 600 csk., Rotterdam, B. Moore & Co.

**MAGNESITE** — 354 csk. calcined, Rotterdam, Brown Bros. & Co.; 98 bbl., Rotterdam, H. J. Baker & Bros.; 100 csk. and 250 bg., Rotterdam, Brown Bros. & Co.

## Opportunities in the Foreign Trade

*Parties interested in any of the following opportunities may obtain all available information from the Bureau of Foreign and Domestic Commerce at Washington or from any district office of the bureau. The number placed after the opportunity must be given for the purpose of identification.*

ACID, LACTIC, sulphate of magnesia, sulphite and sulphide of soda. Concepcion, Chile. Purchase.—13,218.

TANNING CHEMICALS. Gabrova, Bulgaria. Agency.—13,240.

COAL-TAR PRODUCTS and naval stores. Vienna, Austria. Purchase and agency.—13,186.

ROSIN AND STEARINE. Riga, Latvia. Agency.—13,231.

ROSIN AND TURPENTINE. Amsterdam, Netherlands. Purchase.—13,220.

LINSEED OIL CAKE. Belfast, Ireland. Purchase.—13,188.

**MYROBALANS** — 650 pkg., Calcutta, National City Bank; 255 pkts., Calcutta, Order; 1,450 pkts., Bombay, National Bank of South Africa; 4,752 pkts., Bombay, Order.

**OILS—Cod**—80 bbl., St. Johns, Bowring & Co. **Coconut**—1,157 tons, Manila, Jenkins, Inc.; 923 tons, Cebu, Philippine Refining Corp.; 889 tons, Manila, Spencer Kellogg & Sons. **China wood**—900 bbl., Hankow, Japan Cotton Trading Co.; 300 bbl., Hankow, Mitsubishi Shoji Kaisha; 200 bbl., Hankow, Mitsui & Co.; 200 csk., Hankow, I. R. Boody & Co.; 75 csk., Shanghai, Order; 158 bbl., Hankow, Bank of the Manhattan Co.; 150 bbl., Shanghai, Viele, Blackwell & Buck. **Linseed**—70 bbl., Rotterdam, Chesman, Elliott Co.; 590 bbl. and 96 dr., Rotterdam, Order. **Olive foots** (sulphur oil)—200 bbl., Catania, National Bank of Commerce; 200 bbl., Catania, National City Bank; 400 bbl., Milazzo, Order. **Palm kernel**—206 bbl., Liverpool, Order. **Palm**—137 dr., Hamburg, Order; 476 csk., Hamburg, African & Eastern Trading Co.; 188 csk., Liverpool, Guaranty Trust Co.; 40 csk., Liverpool, Order; 208 csk., Liverpool, Order. **Perilla**—477 bbl., Dairen, Balfour, Williamson & Co.; 250 bbl., Kobe, Cook & Swan Co. **Rapeseed**—100 bbl., Rotterdam, J. C. Francesconi & Co.; 150 bbl., Kobe, Oriental Vegetable Oil Co.; 75 bbl., Glasgow, Order. **Sardine**—250 bbl., Kobe, Mitsui & Co.

**OILSEEDS — Copra** — 39 bg., Panama, Franklin Baker Co.; 200 bg., Port Antonio, Atlantic Navigation Co.; 150 tons, Cebu, Order. **Castor**—5,000 bg., Santos, Central Union Trust Co.; 1,764 bg., Dairen, I. R. Boody & Co.; 14,215 bg., Calcutta, Volkart Bros.; 4,074 bg., Bombay, Order; 1,000 bg., Santos, National City Bank. **Linseed** — 1,099 tons (in bulk), 72,462 bg., Buenos Aires, Spencer Kellogg & Sons. **Rapeseed** —1,315 bg., Otaru, Order. **Sesame**—1,500 bg., Hankow, Order.

**PLUMBAGO** — 275 bg., Marseilles, National City Bank; 514 bg., Marseilles, Bank of the Manhattan Co.; 250 bg., Marseilles, Paterson, Boardman & Knapp; 200 bbl., Colombo, Order.

**POTASSIUM SALTS**—1,016 bg. nitrate and 302 csk. do., Hamburg, Kuttroff, Pickhardt & Co.; 50 csk. bicarbonate, Rotterdam, Meteor Products Co.; 148 dr. caustic, Hamburg, Order; 44 bbl. alum, Hamburg, Order; 104 cs. caustic, Gothenburg, Mallinckrodt Chemical Works; 460 bg. nitrate, Hamburg, Order.

**PUMICE** — 3,495 bg., Lipari, K. J. Griffiths & Co.; 6,939 bg., Lipari, Gallagher & Ascher; 365 pkg., Lipari, Order.

**QUEBRACHO**—20,560 bg., Buenos Aires, International Products Co.; 9,664 bg., Buenos Aires, Tannin Corp.

**QUICKSILVER**—200 flasks, Trieste, A. H. Pickering; 50 flasks, Trieste, H. W. Peabody & Co.; 400 flasks, Leghorn, Order; 300 flasks, Genoa, Order; 200 flasks, Leghorn, Leghorn Trading Co.; 100 flasks, Leghorn, Order.

**SAL AMMONIAC**—455 csk., Rotterdam, Kuttroff, Pickhardt & Co.

**SHELLAC**—30 cs., Hamburg, Order; 600 pkg., Calcutta, Order; 330 cs. sticklac, Bangkok, Order; 25 cs., London, Rogers-Pyatt Shellac Co.; 37 cs., Rotterdam, C. F. Gerlach.

**SODIUM SALTS**—4,266 bg. nitrate, Antofagasta, Wessel, Duval & Co.; 6,872 bg. do., Iquique, E. I. du Pont de Nemours & Co.; 18,243 bg. do., Iquique, Wessel, Duval & Co.; 265 dr. sulphate, Rotterdam, C. S. Grant & Co.; 71 csk. hydrosulphate, Rotterdam, Kuttroff, Pickhardt & Co.; 13,622 bg. nitrate, Iquique, W. R. Grace & Co.; 54 csk. prussiate, Rotterdam, Meteor Products Co.; 63 cs. cyanide, Havre, Anglo South American Trust Co.; 200 bg. silico fluoride, Hamburg, Jungmann & Co.; 133 dr. sulphate, Rotterdam, C. S. Grant & Co.; 50 kegs hydrosulphate, Rotterdam, H. A. Metz & Co.; 184 dr. cyanide, Liverpool, Order; 65 csk. phosphate, Antwerp, Roessler & Hasslacher Chem. Co.; 6,817 bg. nitrate, Antofagasta, Graham, Rowe & Co.; 6,960 bg. do., Antofagasta, Anglo-South American Trust Co.

**STRONTIUM NITRATE**—305 csk., Rotterdam, Meteor Products Co.

**SUMAC** — 1,050 bg. ground, Palermo, Order; 100 bl., Palmero, Order.

**TALC** — 860 bg., Bordeaux, Salomon Bros.; 200 bg., Genoa, Kountze Bros.; 200 bg., Genoa, C. Mathieu; 200 bg., Genoa, C. B. Chrystal Co.; 250 bg., Genoa, National City Bank; 1,600 bg., Genoa, Order.

**TARTAR** — 10 pkg., Naples, C. B. Richard & Co.; 17 csk., Naples, Tartar Chemical Co.

**VANADIUM ORE** — 9,596 bg. Callao, Vanadium Corp. of Am.

**WAXES** — 32 bg. beeswax, Alexandria, Bank of America; 77 cs. spermaceti, Glasgow, Order; 35 bg. beeswax, Genoa, Italia America Co.; 42 cs. beeswax, Rio de Janeiro, American Trading Co.; 31 bx. do., Rio de Janeiro, National City Bank; 739 bg. carnauba, Para, National City Bank; 56 bg. do., Para, Order; 26 bg. do., Ceara, N. Y. Trust Co.; 181 bg. do., Ceara, National City Bank; 166 bg. do., Ceara, National Bank of Commerce; 352 bg. do., Ceara, Lazard Freres; 124 bg. do., Ceara, Order; 10 bg. beeswax, Rio de Janeiro, Elbert & Co.

**WOOL GREASE** — 18 bbl., Bremen Pfaltz & Bauer.

**ZINC CHLORIDE**—35 dr., Rotterdam, C. Hardy, Inc.

**ZINC OXIDE** — 50 bbl., Marseilles, Reichard-Coulston, Inc.; 105 csk., Marseilles, Order.

# Current Prices in the New York Market

***For Chemicals, Oils and Allied Products***

## Industrial Chemicals

| | | | |
|---|---|---|---|
| **Acetone, drums, works** | lb. | $0.12 – | $0.12½ |
| **Acetic anhydride, 85%, dr** | lb. | .36 – | .38 |
| **Acid, acetic, 28%, bbl** | 100 lb. | 3.12 – | 3.37 |
| Acetic, 56%, bbl | 100 lb. | 5.85 – | 6.10 |
| Acetic, 80%, bbl | 100 lb. | 8.19 – | 8.44 |
| Glacial, 99½%, bbl | 100 lb. | 11.01 – | 11.51 |
| Boric, bbl | lb. | .09 – | .09½ |
| Citric, kegs | lb. | .45½– | .46½ |
| Formic, 85% | lb. | .10½– | .10½ |
| Gallic, tech | lb. | .45½– | .47 |
| Hydrofluoric, 52%, carboys | lb | .11 – | .12 |
| Lactic, 44%, tech., light, bbl | lb. | .13½– | .14 |
| 22% tech., light, bbl | lb. | .06½– | .07 |
| Muriatic, 18° tanks | 100 lb. | .80 – | .85 |
| Muriatic, 20°, tanks | 100 lb. | .95 – | 1.00 |
| Nitric, 36°, carboys | lb. | .04 – | .04½ |
| Nitric, 42°, carboys | lb. | .04½– | .05¼ |
| Oleum, 20%, tanks | ton | 16.00 – | 17.00 |
| Oxalic, crystals, bbl | lb. | .10½– | .11 |
| Phosphoric, 50% carboys | lb. | .07½– | .07½ |
| Pyrogallic, resublimed | lb. | 1.55 – | 1.60 |
| Sulphuric, 60°, tanks | ton | 8.00 – | 9.00 |
| Sulphuric, 60°, drums | ton | 12.00 – | 13.00 |
| Sulphuric, 66°, tanks | ton | 13.00 – | 14.00 |
| Sulphuric, 66°, drums | ton | 17.00 – | 18.00 |
| Tannic, U.S.P., bbl | lb. | .65 – | .70 |
| Tannic, tech., bbl | lb. | .45 – | .50 |
| Tartaric, imp., powd., bbl | lb. | .27½– | .28 |
| Tartaric, domestic, bbl | lb. | .29 – | .30 |
| Tungstic, per lb | lb. | 1.20 – | 1.25 |
| **Alcohol, butyl, drums, wks** | lb. | .27 – | .30 |
| Ethyl, 190 p'f. U.S.P., bbl | gal. | 4.89 – | ..... |
| Denatured, 190 proof No. 1, special bbl | gal. | .61 – | ..... |
| No. 1, 190 proof, special dr | gal. | .55 – | ..... |
| No. 1, 188 proof, bbl | gal. | .65 – | ..... |
| No. 1, 188 proof, drums | gal. | .58 – | ..... |
| No. 5, 188 proof, bbl | gal. | .60 – | ..... |
| No. 5, 188 proof, dr | gal. | .54 – | ..... |
| **Alum, ammonia, lump, bbl** | lb. | .03½– | .04 |
| Potash, lump, bbl | lb. | .03 – | .03½ |
| Chrome, lump, potash, bbl | lb. | .05½– | .06 |
| **Aluminum sulphate, com., bags** | 100 lb. | 1.40 – | 1.45 |
| Iron free, bags | lb. | 2.40 – | 2.45 |
| Aqua ammonia, 26°, drums | lb. | .06½– | .06½ |
| Ammonia, anhydrous, cyl | lb. | .29 – | .30 |
| **Ammonium carbonate, powd., tech., casks** | lb. | .12 – | .12½ |
| Nitrate, tech., casks | lb. | .09 – | .10 |
| **Amyl acetate tech., drums** | gal. | 3.25 – | 3.50 |
| **Antimony oxide, white, bbl** | lb. | .14½– | .16 |
| **Arsenic, white, powd., bbl** | lb. | .05½– | .06 |
| Red, powd., kegs | lb. | .14½– | .15½ |
| **Barium carbonate, bbl** | ton | 54.00 – | 55.00 |
| Chloride, bbl | ton | 63.00 – | 66.00 |
| Dioxide, 88%, drums | lb. | .17½– | .18 |
| Nitrate, casks | lb. | .07½– | .08½ |
| **Blanc fixe, dry, bbl** | lb. | .03½– | .03¾ |
| **Bleaching powder, f.o.b. wks., drums, contract** | 100 lb. | 1.90 – | ..... |
| Spot, wks., drums | 100 lb. | 2.00 – | 2.15 |
| **Borax, bbl** | lb. | .05 – | .05½ |
| **Bromine, cases** | lb. | .47 – | .48 |
| **Calcium acetate, bags** | 100 lb. | 3.00 – | 3.05 |
| Arsenate, dr | lb. | .08 – | .08½ |
| Carbide, drums | lb. | .05 – | .05½ |
| Chloride, fused, dr. wks | ton | 21.00 – | ..... |
| Gran. drums works | ton | 27.00 – | ..... |
| Phosphate, mono, bbl | lb. | .06½– | .07½ |
| **Carbon bisulphide, drums** | lb. | .06 – | .06½ |
| Tetrachloride, drums | lb. | .07 – | .07½ |
| **Chalk, precip.—domestic, light, bbl** | lb. | .04½– | .04½ |
| Imported, light, bbl | lb. | .04½– | .05 |
| **Chlorine, liquid, tanks, wks** | lb. | .04½– | ..... |
| Contract, tanks, wks | lb. | .04 – | ..... |
| Cylinders, 100 lb., wks | lb. | .05½– | .07½ |
| **Cobalt, oxide, bbl** | lb. | 2.10 – | 2.25 |
| **Copperas, bulk, f.o.b. wks** | ton | 15.00 – | 16.00 |
| **Copper carbonate, bbl** | lb. | .16½– | .17 |
| Cyanide, drums | lb. | .49 – | .50 |
| Oxide, kegs | lb. | .16½– | .16½ |
| Sulphate, dom., bbl | 100 lb. | 4.75 – | 4.80 |
| Imp. bbl | 100 lb. | 4.62½– | ..... |
| **Cream of tartar, bbl** | lb. | .20½– | .21 |
| **Epsom salt, dom., bbl** | 100 lb. | 1.75 – | 2.00 |
| Imp., tech., bags | 100 lb. | 1.35 – | 1.40 |
| U.S.P., dom., bbl | 100 lb. | 2.10 – | 2.35 |
| **Ether, U.S.P., dr concent'd** | lb. | .15 – | .16 |
| **Ethyl acetate, 85%, drums** | gal. | .92 – | .95 |
| Acetate, 99%, dr | gal. | 1.08 – | 1.10 |
| **Formaldehyde, 40%, bbl** | lb. | .09 – | .09½ |
| **Fullers earth—f.o.b. mines** | ton | 7.50 – | 18.00 |
| **Furfural, works, bbl** | lb. | .23 – | ..... |
| **Fusel oil, ref., drums** | gal. | 3.75 – | 4.25 |
| Crude, drums | gal. | 2.75 – | 3.00 |
| **Glaubers salt, wks., bags** | 100 lb. | 1.20 – | 1.40 |
| Imp., bags | 100 lb. | .80 – | .90 |
| **Glycerine, c. p., drums extra** | lb. | .19 – | .19½ |
| Crude 80%, loose | lb. | .12½– | .12½ |
| **Hexamethylene, drums** | lb. | .65 – | .67 |

THESE prices are first-hand quotations in the New York market for industrial chemicals, coal-tar products and related materials used in the industries that produce

| | |
|---|---|
| **Dyes** | **Paper and Pulp** |
| **Paint and Varnish** | **Petroleum** |
| **Ceramic Materials** | **Soap** |
| **Fertilizers** | **Explosives** |
| **Rubber** | **Food Products** |
| **Sugar** | **Metal Products** |

Whenever available these prices are those of the American manufacturer. If for material f.o.b. works or on a contract basis, quotations are so designated. All prices refer to large quantities in original packages.

| | | | |
|---|---|---|---|
| **Lead:** | | | |
| White basic carbonate, dry, casks | lb. | $0.12 – | ..... |
| White, basic sulphate, casks | lb. | .11½– | ..... |
| White, in oil, kegs | lb. | .1347– | ..... |
| Red, dry, casks | lb. | .1375– | ..... |
| Red, in oil, kegs | lb. | .1478– | ..... |
| Acetate, white crys., bbl | lb. | .15½– | ..... |
| Brown, broken, casks | lb. | .14½– | ..... |
| Arsenate, white crys., bbl | lb. | .16 – | $0.18 |
| Lime-Hydrated, b.g., wks | ton | 10.50 – | 12.50 |
| Bbl., wks | ton | 18.00 – | 19.00 |
| Lump, bbl | 200 lb. | 3.63 – | 3.65 |
| Litharge, comm., casks | lb. | .13½– | ..... |
| Lithopone, bags | lb. | .06 – | .06½ |
| Magnesium carb., tech., bags | lb. | .07 – | .08 |
| Methanol, 95%, drums | gal. | .70 – | .72 |
| 97%, drums | gal. | .72 – | .74 |
| Pure, tanks | gal. | .74 – | .76 |
| drums | gal. | .78 – | .80 |
| bbl | gal. | .83 – | .85 |
| Methyl-acetone, t'ks | gal. | .70 – | ..... |
| Nickel salt, double, bbl | lb. | .10 – | ..... |
| Single, bbl | lb. | .10½– | ..... |
| Orange mineral, csk | lb. | .16½– | .17 |
| Phosgene | | .60 – | .75 |
| Phosphorus, red, cases | lb. | .70 – | .75 |
| Yellow, cases | lb. | .37½– | .40 |
| Potassium bichromate, casks | lb. | .08½– | .08½ |
| Bromide, gran., bbl | lb. | .42 – | .48 |
| Carbonate, 80-85%, calcined, casks | lb. | .06 – | .06½ |
| Chlorate, powd | lb. | .06½– | .08½ |
| Cyanide, drums | lb. | .47 – | .52 |
| First sorts, cask | lb. | .08½– | .08½ |
| Hydroxide (caustic potash) drums | lb. | .07½– | .07½ |
| Iodide, cases | lb. | 3.65 – | 3.75 |
| Nitrate, bbl | lb. | .06 – | .07½ |
| Permanganate, drums | lb. | .14½– | .14½ |
| Prussiate, red, casks | lb. | .38 – | .38½ |
| Prussiate, yellow, casks | lb. | .18½– | .19 |
| Salammoniac, white, gran., casks, imported | lb. | .05½– | .06 |
| White, gran., bbl., domestic | lb. | .07 – | .07½ |
| Gray, gran., casks | lb. | .08 – | .09 |
| Salsoda, bbl | 100 lb. | 1.20 – | 1.40 |
| Salt cake (bulk) works | ton | 16.00 – | 18.00 |
| Soda ash, light 58% flat, bulk, contract | 100 lb. | 1.25 – | ..... |
| bags, contract | 100 lb. | 1.38 – | ..... |
| Dense, bulk, contract, basis 58% | 100 lb. | 1.35 – | ..... |
| bags, contract | 100 lb. | 1.45 – | ..... |
| Soda, caustic, 76%, solid, drums contract | 100 lb. | 3.10 – | ..... |
| Caustic, ground and flake, contracts, dr | 100 lb. | 3.50 – | 3.85 |
| Caustic, solid, 76% f.a.s. N. Y | 100 lb. | 2.98 – | 3.05 |
| Sodium acetate, works, bbl | lb. | .05 – | .05½ |
| Bicarbonate, bulk | 100 lb. | 1.75 – | ..... |
| Bichromate, casks | lb. | .06½– | .06½ |
| Bisulphate (niter cake) | ton | 6.00 – | 7.00 |
| Bisulphite, powd., U.S.P., bbl | lb. | .04½– | .04½ |
| Bromide, bbl | lb. | .43 – | .47 |
| Chlorate, kegs | lb. | .06½– | .06½ |
| Chloride | long ton | 12.00 – | 13.00 |
| Cyanide, cases | lb. | .19 – | .22 |
| Flouride, bbl | lb. | .08½– | .09 |
| Hyposulphite, bbl | lb. | .02½– | .02½ |
| Nitrite, casks | lb. | .09 – | .09½ |
| Peroxide, powd., cases | lb. | .23 – | .27 |
| Phosphate, dibasic, bbl | lb. | .03½– | .03¾ |
| Prussiate, yel. bbl | lb. | .10 – | .10½ |
| Salicylate, drums | lb. | $0.38 – | $0.40 |
| Silicate (40°, drums) | 100 lb. | .75 – | 1.16 |
| Silicate (60°, drums) | 100 lb. | 1.75 – | 2.00 |
| Sulphide, fused, 60-62%, drums | lb. | .02½– | .03½ |
| Sulphite, crys., bbl | lb. | .03½– | .03½ |
| Strontium nitrate, powd., bbl | lb. | .09½– | .10 |
| Sulphur chloride, yel drums | lb. | .04½– | .05 |
| Crude | ton | 18.00 – | 19.00 |
| At mine, bulk | ton | 14.00 – | 16.00 |
| Flour, bag | 100 lb. | 2.25 – | 2.35 |
| Dioxide, liquid, cyl | lb. | .08 – | .08½ |
| Tin bichloride, bbl | lb. | .16½– | ..... |
| Oxide, bbl | lb. | .61 – | ..... |
| Crystals, bbl | lb. | .40½– | ..... |
| Zinc carbonate, bags | lb. | .12 – | .14 |
| Chloride, gran., bags | lb. | .06 – | .07½ |
| Cyanide, drums | lb. | .40 – | .41 |
| Dust bbl | lb. | .08 – | .08½ |
| Oxide, lead free, bags | lb. | .07½– | ..... |
| 5% lead sulphate bags | lb. | .06½– | ..... |
| French, red seal, bags | lb. | .09½– | ..... |
| French, green seal, bags | lb. | .10½– | ..... |
| French, white seal, bbl | lb. | .11½– | ..... |
| Sulphate, bbl | 100 lb. | 3.25 – | 3.50 |

## Coal-Tar Products

| | | | |
|---|---|---|---|
| **Alpha-naphthol, crude, bbl** | lb. | $0.60 – | $0.62 |
| Alpha-naphthol, ref., bbl | lb. | .75 – | .80 |
| Alpha-naphthylamine, bbl | lb. | .35 – | .36 |
| Aniline oil, drums | lb. | .16 – | .16½ |
| Aniline salt, bbl | lb. | .22 – | .23 |
| Anthracene, 80%, drums | lb. | .65 – | .70 |
| Anthraquinone, 25%, drums | lb. | .65 – | .67 |
| Benzaldehyde U.S.P., tech., drums | lb. | .69 – | .71 |
| Benzene, pure, tanks, works | gal. | .23 – | ..... |
| Benzene, 90%, tanks, works | gal. | .21 – | ..... |
| Benzidine base, bbl | lb. | .78 – | .80 |
| Benzyl chloride, ref. carboys | lb. | .35 – | ..... |
| Benzyl chloride, tech., drums | lb. | .25 – | ..... |
| Beta-naphthol, tech., bbl | lb. | .24 – | .25 |
| Beta-naphthylamine, tech | lb. | .65 – | .70 |
| Cresylic acid, 97%, drums | gal. | .59 – | .62 |
| 95-97%, drums, works | gal. | .55 – | .57 |
| Dichlorbenzene, drums | lb. | .07 – | .08½ |
| Dinitrobenzene, bbl | lb. | .15 – | .17½ |
| Dinitrochlorbenzene, bbl | lb. | .20 – | .21 |
| Dinitrophenol, bbl | lb. | .35 – | .40 |
| Dinitrotoluen, bbl | lb. | .18 – | .20 |
| Dip oil, 25%, drums | gal. | .26 – | .28 |
| H-acid, bbl | lb. | .70 – | .74 |
| Meta-phenylenediamine, bbl | lb. | .90 – | .95 |
| Monochlorbenzene, drums | lb. | .08½– | .10 |
| Naphthalene, flake, bbl | lb. | .05 – | .05½ |
| Naphthionate of soda, bbl | lb. | .60 – | .65 |
| Naphthionic acid, crude, bbl | lb. | .60 – | .62 |
| Nitrobenzene, drums | lb. | .09 – | .09½ |
| Nitro-naphthalene, bbl | lb. | .25 – | .27 |
| Nitro-toluene, drums | lb. | .13½– | .14 |
| N-W acid, bbl | lb. | 1.10 – | 1.15 |
| Ortho-amidophenol, kegs | lb. | 2.40 – | 2.50 |
| Ortho-dichlorbenzene, drums | lb. | .10 – | .11 |
| Ortho-toluidine, bbl | lb. | .17 – | .18 |
| Para-aminophenol, base, kegs | lb. | 1.15 – | 1.20 |
| Para-dichlorbenzene, bbl | lb. | .17 – | .20 |
| Para-nitraniline, bbl | lb. | .65 – | .67 |
| Para-nitrotoluene, bbl | lb. | .40 – | .42 |
| Para-phenylendiamine, bbl | lb. | 1.25 – | 1.35 |
| Para-toluidine, bbl | lb. | .70 – | .75 |
| Phenol, U.S.P., dr | lb. | .23 – | .25 |
| Picric acid, bbl | lb. | .20 – | .22 |
| Pitch, tanks, works | ton | 27.00 – | 30.00 |
| Pyridine, imp., drums | gal. | 4.15 – | 4.25 |
| Resorcinol, tech., kegs | lb. | 1.30 – | 1.40 |
| Resorcinol, pure, kegs | lb. | 2.00 – | 2.25 |
| R-salt, bbl | lb. | .50 – | .55 |
| Salicylic acid, tech., bbl | lb. | .32 – | .33 |
| Salicylic acid, U.S.P., bbl | lb. | .35 – | ..... |
| **Solvent naphtha, water-white, tanks** | gal. | .24 – | .25 |
| Crude, tanks | gal. | .21 – | .22 |
| Sulphanilic acid, crude, bbl | lb. | .16 – | .18 |
| Tolidine, bbl | lb. | 1.00 – | 1.05 |
| Toluidine, mixed, kegs | lb. | .30 – | .35 |
| Toluene, tank cars, works | gal. | .26 – | ..... |
| Toluene, drums, works | gal. | .31 – | ..... |
| Xylidine, drums | lb. | .40 – | .42 |
| Xylene, 5 deg.-tanks | gal. | .36 – | .38 |
| Xylene, com., tanks | gal. | .24 – | .26 |

## Naval Stores

| | | | |
|---|---|---|---|
| **Rosin B-D, bbl** | 280 lb. | $8.20 – | $8.30 |
| Rosin E-I, bbl | 280 lb. | 8.30 – | 8.40 |
| Rosin K-N, bbl | 280 lb. | 8.40 – | 8.50 |
| Rosin W.G.-W.W., bbl | 280 lb. | 9.50 – | 10.25 |
| Turpentine, spirits of, bbl | gal. | .93 – | ..... |
| Wood, steam dist., bbl | gal. | .80 – | .81 |
| Wood, dest. dist., bbl | gal. | .72 – | .73 |
| Pine tar pitch, bbl | 200 lb. | 5.50 – | ..... |
| Tar, kiln burned, bbl | 500 lb. | 12.00 – | 12.50 |
| Rosin oil, first run, bbl | gal. | .45 – | ..... |
| Pine tar oil, com'l | gal. | .30 – | ..... |

## Animal Oils and Fats

| | | | |
|---|---|---|---|
| Degras, bbl. | lb. | $0.03½– | $0.05½ |
| Grease, yellow, loose | lb. | .09¼ | .09½ |
| Lard oil, Extra No. 1, bbl. | gal. | .96 – | .98½ |
| Lard compound, bbl. | lb. | .13½ – | .13¾ |
| Neatsfootoil, 20 deg. bbl. | gal. | 1.35 – | 1.37 |
| Oleo Stearine | lb. | .10¾– | ..... |
| Oleo oil, No. 1, bbl. | lb. | .14¼– | ..... |
| Red oil, distilled, d.p. bbl. | lb. | .11 – | .11½ |
| Tallow extra, loose works | lb. | .10¼– | ..... |
| Tallow oil, acidless, bbl. | gal. | .92 – | .94 |

## Vegetable Oils

| | | | |
|---|---|---|---|
| Castor oil, No. 3, bbl. | lb. | $0.17 – | $0.17½ |
| Castor oil, No. 1, bbl. | lb. | .17½– | .17¾ |
| Chinawood oil, bbl. | lb. | .15 – | .15½ |
| Coconut oil, Ceylon, bbl. | lb. | .11¼– | .11½ |
| Ceylon, tanks, N. Y. | lb. | .10¼– | .10½ |
| Corn oil, crude, bbl. | lb. | .12½– | ..... |
| Crude, tanks, f.o.b. mill) | lb. | .10½– | ..... |
| Cottonseed oil, crude (f.o.b. mill), tanks | lb. | .09½– | .09½ |
| Summer yellow, bbl. | lb. | .11½– | .11¾ |
| Linseed oil, raw, car lots, bbl. | gal. | 1.15 – | ..... |
| Raw, tank cars (dom.) | gal. | 1.09 – | ..... |
| Boiled, cars, bbl. (dom.) | gal. | 1.17 – | ..... |
| Olive oil, denatured, bbl. | gal. | 1.18 – | 1.22 |
| Sulphur, (foots) bbl. | lb. | .09½– | .09¾ |
| Palm, Lagos, casks | lb. | .09¼– | ..... |
| Niger, casks | lb. | .09 – | .09½ |
| Palm kernel, bbl. | lb. | .10¾– | ..... |
| Peanut oil, crude, tanks (mill) | lb. | .10¼– | .11 |
| Refined, bbl. | lb. | .16 – | .16½ |
| Perilla, bbl. | lb. | .14½– | .14¾ |
| Rapeseed oil, refined, bbl. | gal. | .95 – | .97 |
| Sesame, bbl. | lb. | .15 – | .15½ |
| Soya bean (Manchurian), bbl | lb. | .13 – | ..... |
| Tank, f.o.b. Pacific Coast | lb. | .11¼– | .11½ |

## Fish Oils

| | | | |
|---|---|---|---|
| Cod, Newfoundland, bbl. | gal. | $0.64 – | $0.66 |
| Menhaden, light pressed, bbl. | gal. | .70 – | .72 |
| White bleached, bbl. | gal. | .72 – | .74 |
| Crude, tanks (f.o.b. factory) | gal. | .55 – | .... |
| Whale No. 1 crude, tanks, coast | lb. | ..... – | .... |
| Winter, natural, bbl. | gal. | .75 – | .76 |
| Winter, bleached, bbl. | gal. | .78 – | .... |

## Dye & Tanning Materials

| | | | |
|---|---|---|---|
| Albumen, blood, bbl. | lb. | $0.50 – | $0.55 |
| Albumen, egg, tech, kegs | lb. | .90 – | .95 |
| Cochineal, bags | lb. | .33 – | .35 |
| Cutch, Borneo, bales | lb. | .04½– | .05 |
| Rangoon, bales | lb. | .13 – | .13½ |
| Dextrine, corn, bags 100 | lb. | 4.67 – | 4.87 |
| Gum, bags 100 | lb. | 4.94 – | 5.07 |
| Divi-divi, bags | ton | 42.00 – | 43.00 |
| Fustic, sticks | ton | 30.00 – | 35.00 |
| Chips, bags | lb. | .04 – | .05 |
| Gambier com., bags | lb. | .18 – | .19 |
| Logwood, sticks | ton | 25.00 – | 26.00 |
| Chips, bags | lb. | .02½– | .03 |
| Sumac, leaves, Sicily, bags | ton | 165 00 – | 175.00 |
| Domestic, bags | ton | 50.00 – | 55.00 |
| Starch, corn, bags 100 | lb. | 4.02 – | 4.29 |

## Extracts

| | | | |
|---|---|---|---|
| Archil, cone., bbl. | lb. | $0.16 – | $0.19 |
| Chestnut, 25% tannin, tanks. | lb. | .01½– | .02½ |
| Divi-divi, 25% tannin, bbl. | lb. | .05 – | .05 |
| Fustic, liquid, 42°, bbl. | lb. | .08 – | .09½ |
| Gambier, liq., 25% tannin, bbl. | lb. | .13½– | .14 |
| Hematine crys., bbl. | lb. | .14 – | .18 |
| Hemlock, 25% tannin, bbl. | lb. | .03½– | .04 |
| Hypernic, liquid, 51°, bbl. | lb. | .12 – | .13 |
| Logwood, crys., bbl. | lb. | .14 – | .15 |
| Liq., 51°, bbl. | lb. | .07½– | .08½ |
| Osage Orange, 51°, liquid, bbl. | lb. | .07 – | .08 |
| Quebracho, solid, 65% tannin, bbl. | lb. | .04½– | .04¾ |
| Sumac, dom., 51°, bbl. | lb. | .06½– | .06¾ |

## Dry Colors

| | | | |
|---|---|---|---|
| Blacks–Carbongas, bags, f.o.b. works, contract | lb. | $0.06 – | $0.08 |
| spot, bags | lb. | .08 – | .12 |
| Lampblack, bbl. | lb. | .12 – | .40 |
| Mineral, black | ton | 35.00 – | 45.00 |
| Blues–Prussian, bbl. | lb. | .35 – | .37 |
| Ultramarine, bbl. | lb. | .08 – | .35 |
| Browns, Sienna, Ital., bbl. | lb. | .05 – | .12 |
| Sienna, Domestic, bbl. | lb. | .03 – | .03½ |
| Umber, Turkey, bbl. | lb. | .04 – | .04½ |
| Greens-Chrome, C.P.Light, bbl. | lb. | .30 – | .32 |
| Chrome, commercial, bbl. | lb. | .11 – | .12 |
| Paris, bulk | lb. | .24 – | .26 |
| Reds, Carmine No. 40, tins | lb. | 4.25 – | 4.50 |
| Iron oxide red, casks | lb. | .08 – | .12 |
| Para toner, kegs | lb. | .95 – | 1.00 |
| Vermilion, English, bbl. | lb. | 1.40 – | 1.45 |
| Yellow, Chrome, C.P. bbls | lb. | .20 – | .22 |
| Ocher, French, casks | lb. | .02 – | .03 |

## Waxes

| | | | |
|---|---|---|---|
| Beeswax, crude, Afr. bg. | lb. | $0.38 – | $0.39 |
| Refined, light, bags | lb. | .48 – | .50 |
| Candelilla, bags | lb. | .29 – | .30 |
| Carnauba, No. 1, bags | lb. | .37 – | .38 |
| No. 2, North Country, bags | lb. | .31 – | .32 |
| No. 3, North Country, bags | lb. | .27½– | .28 |
| Japan, cases | lb. | $0.16 – | $0.16½ |
| Montan, crude, bags | lb. | .06 – | .06½ |
| Paraffine, crude, match, 105-110 m.p., bbl. | lb. | .06½– | .06¼ |
| Crude, scale 124-126 m.p. bags | lb. | .05½– | ..... |
| Ref., 118-120 m.p. bags | lb. | .06 – | .06¼ |
| Ref., 123-125 m.p., bags | lb. | .06½– | .06½ |
| Stearic acid, agle. pressed, bags | lb. | .12½– | .13 |
| Double pressed, bags | lb. | .13½– | .14 |

## Fertilizers

| | | | |
|---|---|---|---|
| Acid phosphate, 16%, wks. | ton | $7.50 – | $7.75 |
| Ammonium sulphate, bulk f.o.b. works 100 | lb. | 2.75 – | ..... |
| Blood, dried, bulk | unit | 3.85 – | 3.95 |
| Bone, raw, 3 and 50, ground. | ton | 26.00 – | 28.00 |
| Fish scrap, dom., dried, wks. | unit | 5.00 – | ..... |
| Nitrate of soda, bags 100 | lb. | 2.62 – | ..... |
| Tankage, high grade, f.o.b. Chicago | unit | 3.10 – | 3.20 |
| Phosphate rock, f.o.b. mines | | | |
| Florida pebble, 68-72%. | ton | 3.00 – | 3.50 |
| Tennessee, 75% | ton | 6.50 – | 6.75 |
| Potassium muriate, 80%, bags | ton | 34.55 – | .... |
| Sulphate, bags, 90% | ton | 45.85 – | .... |
| Double manure salt, bgs. | ton | 26.35 | ..... |
| Kainit, 14%, bgs | ton | 10.2[illegible] | ..... |

## Crude Rubber

| | | | |
|---|---|---|---|
| Para—Upriver fine | lb. | $0.35½– | ..... |
| Upriver coarse | lb. | .27½– | ..... |
| Plantation—First latex crepe | lb. | .35 – | ..... |
| Ribbed smoked sheets | lb. | .35 – | ..... |

## Gums

| | | | |
|---|---|---|---|
| Copal, Congo, amber, bags | lb | $0.08½– | $0.10 |
| East Indian, bold, bags | lb. | .14 – | .15 |
| Manila, amber, bags | lb. | .14 – | .16 |
| Damar, Batavia, cases | lb. | .28½– | .28¾ |
| Singapore, No. 1, cases | lb. | .31 – | .31½ |
| Singapore, No. 2, cases | lb. | .21 – | .21½ |
| Kauri, No. 1, cases | lb. | .62 – | .64 |
| Ordinary chips, cases | lb. | .21 – | .22 |
| Manjak, Barbados, bags | lb. | .06 – | .12 |

## Shellac

| | | | |
|---|---|---|---|
| Shellac, orange fine, bags | lb. | $0.64 – | $0.65 |
| Orange superfine, bags | lb. | .66 – | .67 |
| Bleached, bonedry | lb. | .71 – | .73 |
| T. N., bags | lb. | .62 – | .63 |

## Miscellaneous Materials

| | | | |
|---|---|---|---|
| Asbestos, crude No. 1 f.o.b., Quebec sh. ton | | $325.00– | $400.00 |
| Shingle, f.o.b., Quebec sh. ton | | 45.00 – | 50.00 |
| Cement, f.o.b., Quebec sh. ton | | 15.00 – | 20.00 |
| Barytes, grd., white, f.o.b. mills, bbl. net ton | | 17.00 – | 17.50 |
| Grd., off-color, f.o.b., Balt net ton | | 13.00 – | 14.00 |
| Floated, f.o.b., St. Louis, bbl. net ton | | 23.00 – | 24.00 |
| Crude f.o.b. mines, bulk net ton | | 8.00 – | 8.50 |
| Casein, bbl., tech. lb | | .10½– | .12 |
| China clay (kaolin) crude, No. 1, f.o.b. Ga. net ton | | 6.50 – | 8.00 |
| Powd., f.o.b. Ga. net ton | | 12.00 – | 15.00 |
| Crude, f.o.b. Va. net ton | | 5.50 – | 7.00 |
| Ground, f.o.b. Va. net ton | | 10.00 – | 20.00 |
| Imp., powd. net ton | | 45.00 – | 50.00 |
| Feldspar, No. 1 f.o.b. N.C. long ton | | 6.50 – | 7.25 |
| No. 2 f.o.b. N.C. long ton | | 4.50 – | 5.00 |
| No. 1 gr'd. Me. long ton | | 19.00 – | 20.00 |
| No. 1 Can., f.o.b., mill, powd. long ton | | 25.00 – | ..... |
| Graphite, Ceylon, lump, first quality, bbl. | lb. | .07 – | .07½ |
| High grade amorphous crude | ton | 15.00 – | 35.00 |
| Gum arabic, amber, sorts, bags | lb. | .13 – | .13½ |
| Tragacanth, sorts, bags | lb. | .50 – | .55 |
| No. 1, bags | lb. | 1.15 – | 1.20 |
| Kieselguhr, f.o.b. Cal. | ton | 40.00 – | 42.00 |
| F.o.b. N.Y. | ton | 50.00 – | 55.00 |
| Magnesite, calcined | ton | 35.00 – | 42.50 |
| Pumice stone, imp., casks | lb. | .03 – | .40 |
| Dom., lump, bbl. | lb. | .06 – | .08 |
| Dom., ground, bbl. | lb. | .03 – | .05 |
| Silica, glass sand, f.o.b. Ind. | ton | 2.00 – | 2.25 |
| Sand blast, f.o.b. Ind. | ton | 2.25 – | 3.50 |
| Amorphous, 200-mesh, f.o.b. Ill. | ton | 20.00 – | ..... |
| Glass sand, f.o.b. Ill. | ton | 2.00 – | 2.25 |
| Soapstone, coarse, f.o.b., Vt., bags | ton | 7.00 – | 7.50 |
| Talc, 200 mesh, f.o.b., Vt., bags, extra | ton | 10.50 – | ..... |
| 200 mesh, f.o.b., Ga. | ton | 7.50 – | 10.00 |
| 325 mesh, f.o.b. New York, grade A | ton | 14.75 – | ..... |

## Mineral Oils

Crude, at Wells

| | | | |
|---|---|---|---|
| Pennsylvania | bbl. | $3.00 – | $3.10 |
| Corning | bbl. | 1.75 – | ..... |
| Cabell | bbl. | 1.70 – | ..... |
| Somerset | bbl. | 1.80 – | ..... |
| Illinois | bbl. | 1.37 – | ..... |
| Indiana | bbl. | 1.38 – | ..... |
| Kansas and Okla. under 28 deg. | bbl. | .75 – | .85 |
| California, 35 deg. and up. | bbl. | 1.40 – | ... |

## Gasoline, Etc.

| | | | |
|---|---|---|---|
| Motor gasoline steel bbls | gal. | $0.17 – | ..... |
| Naphtha, V. M. & P. deod, steel bbls | gal. | .16½– | ..... |
| Kerosene, ref. tank wagon | gal. | .13 – | ..... |
| Bulk, W.W. delivered, N.Y. | gal. | .08½– | ..... |
| Lubricating oils: | | | |
| Cylinder, Penn., filtered | gal. | .34 – | $0.35 |
| Bloomless, 30@ 31 grav. | gal. | .24 – | ..... |
| Paraffin, pale 885 vis. | gal. | .16½– | .17 |
| Spindle, 200, pale | gal. | .25– | .26 |
| Petrolatum, amber, bbls. | lb. | .04 – | .04½ |
| Paraffine wax (see waxes) | | | |

## Refractories

| | | | |
|---|---|---|---|
| Bauxite brick, 56% $Al_2O_3$, f.o.b. Pittsburgh | 1,000 | $140– | $145 |
| Chrome brick, f.o.b. Eastern shipping points | ton | 45– | 47 |
| Chrome cement, 40-50% $Cr_2O_3$ | ton | 23– | 27 |
| 40-45% $Cr_2O_3$, sacks, f.o.b. Eastern shipping points | ton | 23.00 | |
| Fireclay brick, 1st. quality, 9-in. shapes, f.o.b. Ky. wks. | 1,000 | 43– | 46 |
| 2nd. quality, 9-in. shapes, f.o.b. wks. | 1,000 | 36– | 40 |
| Magnesite brick, 9-in. straight (f.o.b. wks) | ton | 65– | 68 |
| 9-in. arches, wedges and keys | ton | 80– | 85 |
| Silica brick, 9-in. sizes, f.o.b. Chicago district | 1,000 | 48– | 50 |
| 9-in. sizes, f.o.b., Birmingham | 1,000 | 45– | 47 |
| F.o.b. Mt. Union, Pa. | 1,000 | 40– | 42 |
| Silicon carbide refract brick, 9-in. | 1,000 | 1,180.00 | |

## Ferro-Alloys

| | | | |
|---|---|---|---|
| Ferrotitanium, 15-18% f.o.b. Niagara Falls, ton | | $200.00 – | ..... |
| Ferrochromium, per lb. of Cr, 1-2% C. | lb. | .30 – | ..... |
| 4-6% C. | lb. | .10½– | .11 |
| Ferromanganese, 78-82% Mn. Atlantic, seabd. duty paid | gr. ton | 115.00 – | ..... |
| Spiegeleisen, 19-21% Mn. | gr. ton | 32.00 – | 33.00 |
| Ferromolybdenum, 50-60% Mo, per lb. Mo. | lb. | 1.80 – | 2.00 |
| Ferrosilicon, 10-12% | gr. ton | 39.50 – | 43.50 |
| 50% | gr. ton | 72.00 – | 75.00 |
| Ferrotungsten, 70-80% per lb. of W | lb. | .85 – | .90 |
| Ferro-uranium, 35-50%, of U, per lb. of U. | lb. | 4.50 – | ..... |
| Ferrovanadium, 30-40%, per lb. of V. | lb. | 3.25 – | 4.00 |

## Ores and Mineral Products

| | | | |
|---|---|---|---|
| Bauxite, dom. crushed, dried, f.o.b. shipping points | ton | $5.50 – | $8.75 |
| Chrome ore, Calif. concentrates, 50% min. $Cr_2O_3$ | ton | 21.00 – | 22.00 |
| C.i.f. Atlantic seaboard | ton | 18.50 – | 24.00 |
| Coke, fdry., f.o.b. ovens | ton | 4.75 – | 5.00 |
| Coke, furnace, f.o.b. ovens | ton | 4.00 – | 4.25 |
| Fluorspar, gravel, f.o.b. mines, Illinois | ton | 17.50 – | 18.50 |
| Ilmenite, 52% $TiO_2$ Va. | lb. | .01½– | ..... |
| Manganese ore, 50% Mn, c.i.f. Atlantic seaport | unit | .39 – | .41 |
| Manganese ore, chemical ($MnO_2$) | ton | 75.00 – | 80.00 |
| Molybdenite 85% $MoS_2$, per lb. Mo $S_2$, N. Y. | lb. | .65 – | .75 |
| Monazite, per unit of $ThO_2$, c.i.f., Atl. seaport | lb. | .06 – | .08 |
| Pyrites, Span., fines, c.i.f. Atl. seaport | unit | .11½ – | .12 |
| Pyrites, Span., furnace size, c.i.f. Atl. seaport | unit | .12 – | ..... |
| Pyrites, dom. fines, f.o.b. mines, Ga. | unit | .12 – | ..... |
| Rutile, 94@96% $TiO_2$ | lb. | .12 – | .15 |
| Tungsten ore, scheelite, 60% $WO_3$ and over | unit | 9.50 – | 9.75 |
| Tungsten, wolframite, white, 60% $WO_3$ | unit | 9.00 – | 9.10 |
| Uranium ore (carnotite) per lb. of $U_3O_8$ | lb. | 3.50 – | 3.75 |
| Uranium oxide, 96% per lb. $U_3O_8$ | lb. | 12.25 – | 12.50 |
| Vanadium pentoxide, 76% | lb. | 3.00 – | 3.25 |
| Vanadium ore, per lb. $V_2O_5$ | lb. | 1.00 – | 1.25 |
| Zircon, 99% | lb. | .06 – | .07 |

## Non-Ferrous Metals

| | | | |
|---|---|---|---|
| Copper, electrolytic | lb. | $0.14½– | $0.15 |
| Aluminum, 98 to 99% | lb. | .27 – | .28 |
| Antimony, wholesale, Chinese and Japanese | lb. | .17 – | ..... |
| Nickel, 99% | lb. | .31 – | .32 |
| Monel metal | lb. | .32 | |
| Tin, 5-ton lots, Straits | lb. | .56½ | |
| Lead, New York, spot | lb. | .10 | |
| Zinc, spot, New York | lb. | .0785 | |
| Silver (commercial) | oz. | .68½ | |
| Cadmium | lb. | .60– | .62 |
| Bismuth (500 lb. lots.) | lb | 1.30–1 35 | |
| Cobalt | lb. | 2.50–3.00 | |
| Magnesium, ingots, 99% | lb. | .90–95 | |
| Platinum, refined | oz. | 117.00 | |
| Mercury 75 | lb. | 82.00–83.00 | |
| Tungsten powder | lb. | .95–1.00 | |

# Industrial Developments of the Week

***New Construction and Machinery Requirements in the Process Industries***

### Some Opportunities This Week

**Cement** .....San Mateo, Calif.
**Gas** .....Lake Geneva, Wis.
**Glass** .....Boston, Mass.
**Oil Mill** .....Pearsall, Tex.
**Oil Refinery** .....Toronto, Ont.
**Paper** .....Camas Valley, Ore.
**Paper** .....Three Rivers, Que.
**Parafin** .....Baton Rouge, La.
**Perfumes, etc.** .....Waterford, Ont.
**Pottery** .....Steubenville, O.
**Pulp & Paper** .....Olympia, Wash.
**Rubber** .....Carlisle, Pa.
**Soaps, Scouring Powder, etc.**..Baltimore, Md.
**Sugar** .....Cleveland, O.
**Varnish** .....St. Louis, Mo.

**This page is of value not only as a machinery market but also as an index of the general activity and growth of the industries served by Chem. & Met. The reports are gathered by our regular correspondents who are instructed to verify every detail. Requirements for new machinery will be published here free of charge.**

## *New England*

**Conn., New Britain** — Stanley Works awarded contract for the construction of a 1 story, 23x35 ft., factory for lacquer recovery room, in connection with the manufacture of bolts, etc., on Myrtle Ave., to the Hayes Construction Co., 9 Court St. Estimated cost $6,000.

**Me., Madawaska** — The Fraser Companies, Edmunston, N. B., will soon receive bids for the construction of a large paper plant here, initial cost approximately $1,000,000.

**Mass., Roxbury** — (Boston P. O.) — The Illinois Glass Co., 148 State St., awarded contract for the construction of a 1 story, 75x285 ft. plant unit on Leon St., to Morton C. Tuttle, 862 Park Sq. Bldg., Boston. Private plans.

## *Middle Atlantic*

**Md., Baltimore**—The Gold Dust Corporation, 239 West 30th St., New York, awarded contract for the construction of a complete plant, including power house, in the Canton District, for the manufacture of Gold Dust washing powder, scouring powder, soap, etc., to Lockwood, Greene & Co., 1 Pershing Sq., New York.

**N. Y., Niagara Falls**—F. J. Tones, Sugar and College Aves., plans the enlargement of electrode plant. Estimated cost $150,000.

**Pa., Carlisle**—The Watson Engineering Co., 15 Park Row, New York, will receive bids for the construction of a 1 story, 60x200 ft. addition to the Carlisle Tire and Rubber Co. plant here. Estimated cost $30,000.

## *South*

**Fla., Jacksonville**—Bo-Kay Perfume Co., 732 Forest Ave., perfume manufacturers, awarded contract for the construction of 2 story factory, on Forest and Grape Sts., to H. F. McAden. Estimated cost $25,000.

**La., Baton Rouge** — The Standard Oil Company of Louisiana has obtained permission to close certain streets in the vicinity of its plant, approximately 10 or 15 acres, and plans the construction of an enlarged paraffin plant.

## *Middle West*

**Mich., Detroit**—Unique Brass Manufacturing Co., 5450 West Jefferson Ave., is in the market for miscellaneous machine shop equipment, for working brass.

**O., Canton** — Steubenville Pottery Co., Steubenville, awarded contract for the construction of a pottery to H. K. Ferguson, 4900 Euclid Ave., Cleveland. Estimated cost, with equipment $250,000.

**Wis., Lake Geneva**—Walworth County Gas Co., c/o J. F. Ryan, 423 Highland Ave., Elgin, Ill., plans the construction of a gas plant, including 500,000 cu.ft. gas retaining tank, generating house, gas mains, etc. Estimated cost $500,000. Engineer not selected.

**Wis., Oconto Falls**—Falls Manufacturing Co., awarded contract for the construction of an 80 ft. high, 32x40 ft. digester building to C. R. Meyer & Sons, 50 State St., Oshkosh. Estimated cost $40,000. Owner will purchase digester.

## *West of Mississippi*

**Ia., Iowa City**—State Board of Education, W. H. Gemmill, Secy., will take bids about February 15th, for the construction of a 2 story, 222x316 ft., medical laboratory, as an addition to the Rockefeller Medical Building. Estimated cost $600,000. Proudfoot Bird, and Rawson, 810 Hubbell Bldg., Des Moines, are architects.

**Mo., St. Louis** — Phelan-Faust Paint Manufacturing Co., 1215 Pine St., plans the construction of a varnish factory and also a general office building, on Blow St., Loughborough. Estimated cost $200,000.

**Tex., Pearsall**—Frio Cotton Oil Mill Co., plans to improve its oil mill plant and will purchase machinery including engine, seed crusher, etc. Estimated cost $40,000.

## *Far West*

**Calif., Alhambra**—California Metal Enameling Co., 2155 East 51st St., Los Angeles, has purchased an 8 acre site and plans the construction of a stove and refrigerator foundry.

**Calif., San Mateo**—Peralta Cement Co., Room 1010, 110 Sutter St., San Francisco, plans the construction of a new cement plant.

**Ore., Camas Valley**—F. W. Leadbetter, 795 Park St., Portland, president of company recently organized, plans the construction of a paper mill, to include two paper machines, with all necessary equipment, on the Columbia River, west of here. Estimated cost $1,000,000. B. T. McBain, is general manager.

**Wash., Olympia**—Olympia Pulp & Paper Co., c/o W. A. Ball has had plans prepared for the construction of a plant, the first units to consist of a sulphite mill and a paper manufacturing plant. Total estimated cost $250,000.

## *Canada*

**Man., Winnipeg.** — The Dyer Co., 2031 Euclid Ave., Cleveland, O., plans to establish a sugar refinery here. Estimated cost $2,000,000.

**Ont., Humberstone** — Highland Scotch Distillers, Ltd., J. A. Currie, Pres., plans the construction of a large distillery. Equipment including tanks, stills, pumps, etc., will be required.

**Ont., London**—Bd. of Education, c/o S. F. Lawrason, Chm., is having plans prepared for the construction of a new high school, including chemistry and physics laboratories, on East London St. Estimated cost $300,000. L. E. Carrothers, Bd. of Education, is architect. Owner is interested in prices on all equipment.

**Ont., Toronto**—McColl Brothers, 114 Don Esplanade, plan the construction of an oil refinery. Equipment including steel tanks, stills, furnaces, smoke stacks, byproduct machinery, etc., will be required. Estimated cost $150,000.

**Que., Portneuf Station**—J. Ford & Co., J. Ford, Pur. Agt., will purchase two 18 in. diameter, 120 in face smoothing rolls, one brass covered and one rubber covered, for paper machine.

**Que., Sillery**—Quebec Pulp and Paper Co., Ltd., have engaged G. F. Hardy, 309 Broadway, New York, as engineer, for the construction of a six unit paper mill here. Estimated cost $10,000,000.

**Que., Three Rivers**—International Paper Co., 100 East 42nd St., New York, awarded contract to Fraser Brace Co., Montreal, for the extension of paper mill here. Estimated cost $1,000,000.

**Ont., Waterford**—J. V. Bosworth plans the construction of a 2 story, 40x75 ft. factory for the manufacture of perfumes, hair restorers, drug specialties, etc. Prices on equipment wanted.

## *Incorporations*

Telometer Co., Inc., Stamford, Conn., manufacture liquid measuring instruments, $100,000. E. K. Norton, Ocean Drive; J. K. Norton, and E. F. Lofgren, Stamford National Bank Bldg., Stamford.

Watson-Park Co., Sanford, Me., manufacture dyestuffs, soaps, and textile finishing products, $100,000. Frank Watson, Brookline, Mass., Pres. H. F. Shephard, Quincy, Mass., K. B. Park, Worcester, Mass.

The Gleasonite Products Co., Boston, Mass., rubber products, $500,000 and 2,000 shares of stock, no par value. M. Brown, Boston; F. J. Gleason, Cambridge; G. F. Kerr, Newton Highlands.

The John Ryan Co., Boston, Mass., soap and fertilizers, 1,000 shares of stock without par value. J. Ryan, Somerville; R. J. Ryan, Roxbury, and J. A. Ryan, Cambridge.

Houlberg-Kidde Corp., Manhattan, hides, leather, etc., 200 shares common stock, no par value. V. H. Houlberg, F. Kidd, J. D. McKee. (Attorney, A. H. Bersohn, 25 West 43rd St.)

Paracord Co., Johnson City, N. Y., rubber soles, $100,000. C. F. Johnson, Jr., H. E. Christfield, J. W. Matthael. (Attorney, B. L. Babcock, Endicott.)

Dunlop Tire and Rubber Corp. of America, Manhattan, 60,000 shares 2nd preferred stock, $100 each; 200,000 common, same as heretofore.

Shield Paint Products Corp., Manhattan, 50 shares preferred stock, $100 each; 50 common, no par value. R. D. O'Connell, E. Effron, R. Alexander. (Attorneys, Pallister-O'Connell, Woolworth Bldg.)

Walther & Co., New York City, manufacture paper, 5,000 shares common stock, no par value. C. W. Walther, M. Steinhardt, A. Walsh. (Attorney, F. J. Knorr, Albany.)

Koluloid Corporation, New York City, photographic materials, 100 shares common stock, no par value. M. L. Elkin, M. Salit, A. Eichel. (Attorney, Burkan, 1451 Broadway.)

Eclipse Chemical Co., Trenton, 33 West State St., N. J., $400,000 capital divided into $100 shares.

Belmonte Corp., Trenton, N. J., earthen products. $125,000. W. D. Cougle.

Constant Refining Co., refine, store and market, crude oil; $565,000.

Jackson Clay Products Co., Jackson, Tenn. $225,000 capital. F. C. Hamilton, J. J. Moroney, C. E. Pigford.

Peerless Refining Co., Dallas, Tex.; capital $100,000. J. F. Morgan, 406 Rieger St., W. B. Bates, H. B. Matthews.

Manganese Steel Products Corporation, Wilmington, Del., $250,000. A. Wolfe, A. Rich, C. Curran, Washington, D. C. (L. Jones, Wilmington.)

Pacific Lime and Cement Corporation, Dover, Del., $20,000,000. (U. S. Corporation).